YUKON RIVER SALMON 2005 SEASON SUMMARY AND 2006 SEASON OUTLOOK

Prepared by

THE UNITED STATES AND CANADA
YUKON RIVER JOINT TECHNICAL COMMITTEE

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1.0 INTRODUCTION

The U.S. and Canada Yukon River Joint Technical Committee (JTC) Plan listed spawning escapement monitoring a priority to aid managers and to assist with project planning in the Yukon River. A JTC meeting was held in Fairbanks November 7-8, 2005 to discuss Alaska escapement monitoring project priorities. Geographic Units were defined by salmon species and their areas outlined (Attachment). Spawning escapement monitoring and run assessment projects in Alaska were prioritized by species and by Geographic Unit for management needs. The fall JTC meeting was held in Anchorage, Alaska November 21-23, 2005. Sandy Johnston gave an overview of the new Fisheries and Oceans Canada (DFO) Wild Salmon Policy. Canadian Conservation Management Units were outlined and discussed to aid with project planning in the Yukon Territory (Attachment). In addition, presentations were given on postseason summaries of the 2005 fisheries, stock status updates, research project reports, escapement monitoring planning for Alaska and Yukon, Pilot Station and Eagle sonar projects, an *Ichthyophonus* update and Chinook salmon age-sex-size analysis. Geneticists representing the Alaska Department of Fish and Game (ADF&G), the United States Fish and Wildlife Service (USFWS), and DFO genetic laboratories made presentations and participated in a discussion focused on their research, the merits of different DNA analytical techniques, goals for genetic research and potential management applications involving Yukon River salmon stocks. The spring JTC meeting was held in Whitehorse, Yukon Territory from February 27-March 1, 2006. The agenda included a presentation by Linda Brannian on the ADF&G database program, presentation by Kristin Mull representing Yukon River Drainage Fisheries Association on Yukon River Chinook size and age issues, presentation of run outlooks for 2006, border passage recommendations for Canadian salmon stocks in 2006, research planning initiatives, and updates for a number of tasks charged to the JTC at Yukon River Panel meetings including coded wire tags and an inventory of age-size-sex data. Genetics issues were discussed, and the JTC recommended Terry Beacham give a presentation of genetic techniques at the spring panel meeting. The fall and spring JTC agendas were cleared with the chairs of the Yukon River Panel. This report includes information intended for the panelists and for project managers. The groups represented at these meetings and a list of participants for each meeting:

Executive Secretary, Yukon River Panel
- Hugh J. Monaghan[#]

Fisheries and Oceans Canada (DFO)
- Sandy Johnston (JTC Co-Chair)
- Terry Beacham
- Rick Ferguson
- Mary Ellen Jarvis
- Patrick Milligan
- Al von Finster

Alaska Department of Fish and Game (ADF&G)
- Eric Volk (JTC Co-Chair)
- Jim Simon[*]
- Steve Hayes
- Bonnie Borba
- Lisa Seeb[*]
- Fred Bue
- John H. Clark[*]
- Ted Spencer[*]
- Audra Brase[#]
- Dani Evenson
- Bill Templin[*]
- Susan McNeil
- Carl Pfisterer[*]
- Hamachan Hamazaki
- Linda Brannian[#]
- Charlie Swanton[*]

Larry DuBois[*]
John Hilsinger[*]
Christian Smith[*]

Fish and Wildlife Service (USFWS)
Jeff Adams
Jeff Bromaghin
Steve Lewis[*]
Tom McLain
Gerald Maschmann[*]
Blair Flannery[*]
Anne Sittane[*]
Jon Gerken[#]

NOAA-NMFS
Dick Wilmot

Bureau of Land Management (BLM)
Bob Karlen

Geological Survey-Biological Research Division (USGS-BRD)
Jim Finn[*]

Tanana Chiefs Conference (TCC)
Mike Smith[*]

Association of Village Council Presidents (AVCP)
Jennifer Hooper[*]
David Waltemyer

Bering Sea Fishermen's Association (BSFA)
Chris Stark

Yukon River Drainage Fisheries Association (YRDFA)
Michael McDougall*
Kristin Mull
Becca Robbins[*]
Rich Capitan[*]

Fisheries Information Service-Office of Subsistence Management (FIS-OSM)
Cliff Schleusner[*]
Steve Klein[*]
Karen Hyer[*]

Yukon Salmon Committee Observers (YSC)
Gerry Couture
Lorelei Smith[#]

Meeting Attended:
[*] Fall only
[#] Spring only

2.0 COMMERCIAL FISHERY–ALASKA

2.1 CHINOOK AND SUMMER CHUM SALMON

The Yukon River drainage is divided into fishery districts and subdistricts for management purposes (Figure 1). ADF&G uses an adaptive management strategy that evaluates inseason run strength to determine allowable harvest where escapement and subsistence uses are the priority. A preseason management strategy was developed in cooperation with federal subsistence managers that outlined run and harvest outlooks along with the regulatory subsistence salmon fishing schedule described in an information sheet. The 2005 strategy was to implement the subsistence salmon fishing schedule as salmon began to arrive in each district or sub-district in a stepwise manner. Before implementing this schedule, subsistence fishing would be allowed seven days a week to provide opportunity to harvest resident species, such as whitefish, sheefish, pike, and suckers. The informational sheet was also used to prepare fishers for possible reductions to the subsistence salmon fishing schedule or to allow for a small commercial fishery contingent on how the runs developed. The information sheet was mailed to Yukon River commercial permit holders and approximately 2,800 families identified from ADF&G's survey and permit databases. State and federal staff presented the management strategy to the YRDFA, State of Alaska Advisory Committees, Federal Regional Advisory Councils, and other interested and affected parties.

2.1.1 Chinook Salmon

A conservative component of recent preseason management plans was to wait until near the midpoint of the Chinook salmon run before determining if the run was strong enough to support a commercial fishery. This interim strategy was designed to pass fish upstream for escapement, cross-border commitments to Canada, and subsistence uses in the event of a very poor run as occurred in 2000. However, a drawback of this approach is commercial fishing occurs on stocks migrating during the latter half of the run, thus the harvest is not spread out over the run. Further, if the run is strong, delaying commercial fishing results in foregone commercial harvest opportunities. The preferred strategy for a commercial fishery is to fish during the middle 50% of the run, a strategy in place before the runs began to decline in 1998. Additional harvest can occur late in the season depending on information from escapement projects. Since the runs were improving, but expected to be weaker than 2004, the management strategy was to provide for passage of a portion of the early run segment through the lower river districts before commercial fishing started.

Emmonak test fishing indices, subsistence harvest reports, and Pilot Station sonar passage estimates provide information the department used to assess the salmon run in season. As the run progressed upriver, other projects provided additional run assessment information. The age-5 fish from the low run of 2000 were expected to dominate the 2005 run; therefore the department developed a conservative preseason management strategy in 2005 with a potential harvest ranging from 20,000 - 60,000 Chinook salmon.

The lower Yukon River was ice-free on May 17, five days earlier than the historic average of May 22 (1979-2004). The first subsistence catch of Chinook salmon was reported in Aproka Slough on May 25 and the first catch of chum salmon was reported on June 1 near Emmonak. The ADF&G test fishing project recorded its first Chinook salmon catch on June 2. The conditions in the lower river during the early portion of the season were characterized by high

water. As snowmelt in the middle and upper portions of the Yukon River decreased, the water level dropped to normal levels.

Early in the run the 2005 Chinook run appeared weaker than expected, and weaker than the 2004 run. Based on set gillnet test fishing CPUE and preliminary Pilot Station sonar estimates, the run appeared weaker than the 2004 run. Significant high water throughout the first half of June lowered efficiency of the test nets and development of a near shore cut bank caused the Pilot Station sonar to miss fish, which resulted in ADF&G underestimating run strength during the first half of the run. In 2005, the commercial harvest total for Chinook salmon was 32,029 fish (includes 75 Chinook harvested in the fall season) (Table 1), just above the lower end of the preseason outlook.

As the run developed, it became apparent the 2005 Chinook salmon run was better than expected and management of the fishery became more liberal. Based on set gillnet test fishing catch per unit effort (CPUE) and preliminary Pilot Station sonar estimates, the run was stronger than the 2001 and 2002 runs.

According to test fishing CPUE data, approximately 50% (the mid-point) of the Chinook salmon run had entered the lower river by June 23, three days later than the average date for the mid-point (Figure 2). The Pilot Station sonar preliminary passage estimate was approximately 159,984 Chinook salmon (Table 2).The cumulative set gillnet test fishery CPUE in 2005 was 17.60 (Figure 2). Compared to previous years, this CPUE was below the 2000-2004 average of 19.44 and well below the 1989-1997 (before the run decline) and 2003-2004 average of 25.74.

Border passage information also indicated high numbers of Chinook salmon migrating into Canada. The preliminary border passage estimate was about 42,245 Chinook salmon. The escapement objective into Canada has been met consistently for five years, and since objectives were set, 11 of 14 years.

In summary, the 2005 Chinook salmon run was weaker than the run of 2004 and below the 1989-1998 and 2003 average run size.

2.1.2 Summer Chum Salmon

The Yukon River summer chum salmon run was managed according to the guidelines described in the *Yukon River Summer Chum Salmon Management Plan* (Table 3). The management plan provides for escapement needs and subsistence use priority before other consumptive uses such as commercial, sport, and personal use fishing. The plan allows for varying levels of harvest opportunity depending on the run size projection. The department uses the best available data to assess the run: 1) preseason run outlooks, 2) test fishing indices, 3) age and sex composition, 4) subsistence and commercial harvest reports, and 5) escapement monitoring projects.

The Pilot Station sonar project provides an estimate of the number of salmon passing the sonar site; an estimate of the total Yukon River run size requires an estimate of the harvest and escapement below Pilot Station. The inseason East Fork Andreafsky River escapement estimate (multiplied by two, to account for the West Fork Andreafsky River) and the estimated summer chum salmon subsistence harvest and the current year commercial harvest taken below Pilot Station were added to the 2005 inseason Pilot Station passage projection. The corresponding total run size estimate was applied to the summer chum salmon management plan to determine appropriate management actions.

The summer chum salmon entry was characterized as average in run timing. By June 29, the summer chum salmon run at Pilot Station had reached a level that would have allowed a directed summer chum salmon fishery. Before the 2005 season, the department informed buyers and commercial fishers of the potential for a directed summer chum salmon commercial fishery. However, because of poor market conditions and infrastructure problems, the summer chum salmon harvest was incidental to Chinook salmon directed harvests except in District 6 where harvests were directed at summer chum salmon.

2.1.3 Harvest and Value

Total commercial harvest was 32,029 Chinook salmon and 41,264 summer chum salmon (Table 1) sold in the round for the Alaska portion of the Yukon River drainage in 2005. The historical commercial harvest includes the number of salmon sold in the round and the estimated number of salmon harvested to produce roe sold. The 2005 Chinook salmon harvest was the third lowest harvest since statehood and 50% below the 1995-2004 (excluding 2001) average harvest of 63,408 Chinook salmon. The summer chum salmon harvest was the ninth lowest since 1967 and 80% below the 1994-2004 (excluding 2001) average harvest of 204,198 fish, but this may be attributed to market conditions rather than harvestable surplus.

A total of 598 commercial permit holders participated in the Chinook and summer chum salmon fishery during 2005, 10% below the 1994-2004 average of 665 permit holders. The Lower Yukon Area (Districts 1-3) and Upper Yukon Area (Districts 4-6) are separate Commercial Fisheries Entry Commission (CFEC) permit areas. A total of 578 permit holders fished in the Lower Yukon Area in 2005, 5% below the 1994-2004 average of 607 permit holders. In the Upper Yukon Area, 20 permit holders fished, 69% below the 1994-2004 average of 64 permit holders.

Yukon River fishermen in Alaska received an estimated $2.0 million for their Chinook and summer chum salmon harvest in 2005 (Appendix A1), approximately 48% below the 1995-2004 average of $3.5 million. Although the 2005 average price per pound paid to lower river fishers was 26% above the 1995-2004 average of $2.72, the decrease in exvessel value was caused by the reduced harvest of Chinook salmon.

2.1.4 Results by District

Districts 1-3

Lower river test fishing indicated the Chinook salmon migration exhibited steady passage rates from June 11 to June 30, declining thereafter. Catch rates during the first half of June were conservative because high water conditions during the early portion of the run reduced the catchability of the test fishing nets. Additional nets were deployed to increase coverage.

The commercial fishing periods in Districts 1 and 2 had no mesh size restrictions. Small mesh size gear was not utilized because a summer chum salmon market in the lower Yukon River was lacking. There were four commercial fishing periods in District 1 and three periods in District 2. No commercial fishing occurred in District 3 because of the late start of the commercial fishery.

Marketable quality of Chinook salmon was an issue in the lower Yukon River in 2005. Waiting until near the midpoint of the Chinook salmon run before opening the commercial fishery spreads the harvest out over the later portion of the run, which tends to be of lesser quality. Buyers informed the department of these issues and the limitations placed on them. The

department worked closely with buyers to arrange openings to better suit their needs while spreading out the harvest. Because of quality concerns, only three commercial fishing periods occurred in District 2 compared to four periods that occurred in District 1.

The combined total harvest of 30,107 Chinook salmon for Districts 1 and 2 was 50% below the 1995-2004 (excluding 2001) average harvest of 59,698 fish. The average weight of Chinook salmon in the 2005 commercial harvest was 18.9 pounds. Estimated age composition of Chinook salmon samples collected from the lower river commercial harvest was 2.2% age-4, 45.7% age-5, 48.9% age-6, and 3.2% age-7 fish. The lower than average weight was in part caused by the higher than average proportion of 5-year-old fish in the harvest. Sex composition of the samples was 57.0% females and 43.0% males.

Combined commercial summer chum salmon harvest in District 1 and 2 of 32,278 fish and was 45% below the 1995-2004 (excluding 2001) average harvest of 58657 fish. Average weight of summer chum salmon in the 2005 commercial harvest was 6.8 pounds.

Districts 4-6

Historically, the Subdistrict 4-A fishery targets summer chum salmon. The dominant gear type, fish wheels, and the location of the fishery result in a very high chum to Chinook salmon ratio. Despite a proactive approach by the department, no market was found; hence, no commercial openings were allowed in Subdistrict 4-A.

The Anvik River met the minimum escapement of 500,000 summer chum salmon required to allow an in-river commercial fishery, however, the Anvik River Management Area remained closed to commercial fishing in 2005 because of a lack of markets for summer chum salmon. Commercial fishers in Subdistrict 4-A, including the Anvik River management area were greatly impacted by the lack of commercial fishing.

Although the commercial fishing season in District 4 was opened, no commercial fishing periods were announced because no buyer was available.

Three commercial fishing periods were allowed in Subdistricts 5-B and 5-C for a total of 36 hours of fishing time. In 2005, a total of 11 fishers harvested 1,469 Chinook salmon (Table 1) in 33 deliveries. This number was 32% below the lower end of the guideline harvest range of 2,150 fish. Typically, the harvest of summer chum salmon is low in these subdistricts as they are located far above the vast majority of summer chum spawning areas and no commercial harvest occurred in 2005.

Subdistrict 5-D was open to commercial fishing in 2005. No commercial fishing periods were announced for Subdistrict 5-D because of a lack of buyers.

Commercial fishing in District 6 was opened for five 42-hour periods in 2005. Summer chum salmon were targeted during these five commercial fishing periods with some Chinook salmon incidental harvest. Test fish wheel and commercial catches indicated the summer chum salmon run in the Tanana River was above average and warranted commercial fishing. The total estimated commercial harvest was 453 Chinook and 8,896 summer chum salmon harvested by 5 fishers making 23 deliveries in District 6. The Chinook salmon harvest was below the guideline harvest range of 600-800 fish.

The age and sex of Chinook salmon from the upper river commercial harvests (Districts 5 and 6) was 9.9% age-4, 48.2% age-5, 40.8% age-6, and 1.1% age-7 fish. Sex composition was 34.8%

females and 65.2% males. Fish wheels, the dominant gear type in the Upper Yukon River Area, are generally biased in their harvests, tending to catch a higher number of smaller Chinook salmon, which are mostly males.

2.2 Fall Chum and Coho Salmon

2.2.1 Fall Chum Salmon Management Overview

The 2005 Yukon River fall chum salmon run was much stronger than expected. The preseason run projection ranged from 584,000 to 776,000 fish. The high end of the range was derived from normal run size expectations for the parent-year escapements realized throughout the drainage in 2000 and 2001. The low end of the range was primarily based upon the expectations of poor production (average proportion of 0.75) observed in recent fall chum salmon returns (2001 to 2004). The run size was anticipated to provide for escapement needs and subsistence harvest with a surplus of 20,000 to 150,000 fall chum salmon available for commercial harvest. However, the 2005 total run was approximately two million fall chum salmon, the commercial harvest was the highest since 1995, and preliminary indications are the subsistence harvests were the highest since 1999. The preliminary Yukon River drainagewide escapement of 1.8 million is the largest on record, which has been reconstructed back to 1974.

ADF&G follows guidelines provided by the Alaska Board of Fisheries (BOF) in 5 AAC 01.249. *Yukon River Drainage Fall Chum Salmon Management Plan*, amended by the BOF in January 2004 (Table 4). This plan incorporates the U.S./Canada treaty obligations for border passage of fall chum salmon, which are necessary for escapement and prioritized uses. There are incremental provisions in the plan to allow varying levels of subsistence salmon fishing balanced with requirements to attain escapement objectives. Commercial fishing is generally only allowed on the portion of the surplus above the upper end of the drainagewide Biological Escapement Goal (BEG) range of 300,000 to 600,000. The intent of the plan modifications were to put management objectives back in line with the established BEG, to provide more flexibility in managing subsistence harvest when the stocks are low, and to increase the amount of salmon escapement as harvests increase.

Most fall chum salmon typically enter the Yukon River from mid-July through early September in unpredictable pulses that usually last two to three days. Generally, four or five such pulses occur each season. These pulses are often associated with on-shore wind events and/or high tides. Consequently, assessing the run strength is difficult when pulse size and run timing vary so drastically.

With an expectation of improving production, the 2005 preseason management strategy was to begin the fall season on the pre-2001 subsistence fishing regulations in accordance with the management plan. Based on the low fall chum salmon runs observed from 1998 through 2002, and the irregular entry pattern, managers expected to delay the decision to open a commercial fishery until near the midpoint in the fall chum salmon run around late July or early August in the lower river to build confidence in run assessment. The delayed commercial opening was expected to be in line with the higher market demand for coho salmon that overlap in migration timing with the second half of the fall chum salmon run. Thereby, concerns for fall chum salmon would be less likely to curtail the coho salmon commercial harvest because the harvest of both species would be concurrent.

Initial inseason assessment of fall chum salmon for 2005 was influenced by the performance of the summer chum salmon return, which improved substantially with an estimated run size of 2.7 million well above the average of 1.5 million. The linear relationship (1993-1995, 1997-2004) between the summer and fall chum salmon (r^2=0.92) suggested the fall run would perform similarly and thereby would likely exceed the upper end of the preseason projection.

The fall chum salmon run was assessed in season by the drift gillnet test fisheries index projects located at Emmonak (operated by ADF&G), Mountain Village (operated by Asacarsarmiut Traditional Council) and in the middle Yukon River at Kaltag (operated by the City of Kaltag). The Pilot Station sonar project, located in the lower river, provided actual daily passage estimates of fall chum salmon used to derive run size projections which triggered management actions as dictated by the fall chum salmon management plan. Relationships in run timing and run strength from the various index projects and subsistence fishing reports were compared for consistency with the Pilot Station sonar estimates as a method to check if projects appeared to be operating correctly. In 2005, each pulse of fall chum salmon were detected by the Emmonak and Mountain Village drift gillnet test fishery projects. The catch rates at these lower Yukon River projects appeared to correlate well with other assessment projects for run timing and relative magnitude of each pulse. Individual pulses were tracked as they moved up river and the Pilot Station sonar was used to estimate the abundance of each pulse (Figure 3).

The fall chum salmon management plan went into effect on July 16 by regulation. Subsistence fishing management actions, initiated during the summer season, were continued into the fall season. The Coastal District, Districts 1, 2, and 3 and the Innoko River were open seven days per week. Similar management, consistent with the pre-2001 subsistence salmon fishing regulations, continued sequentially in the Upper Yukon Area districts as the fall chum salmon run migrated into those areas.

The fall chum salmon run was strong from the beginning of the season. Each pulse of fall chum salmon typically takes approximately 20 days to reach the confluence of the Tanana River and another 10 days to migrate to the Canadian Border. The first significant pulse began entering the mouth of the Yukon River on July 18 and lasted two days. The abundance was estimated to be approximately 180,000 fish by the Pilot Station sonar and was suspected to contain a large proportion of summer chum. This pulse was followed by eight days of very low passage rates before the second pulse began entering on July 29. The second pulse was also approximately 180,000 fish and lasted three days. The third pulse began entering the river on August 5, lasted four days, and was estimated by the Pilot Station sonar to include approximately 810,000 fall chum salmon. The third pulse was exceptionally large and set a new record for highest single day passage rate for either summer or fall chum salmon. August 8 is the average midpoint for fall chum salmon passage at the Pilot Station sonar project (2005 was August 9). The 2005 cumulative passage estimate of 1.1 million to that date was significantly above the historical average of 260,000 for the project. Following the third pulse, daily passage remained slow for ten days until August 18 when the fourth pulse began to enter the river. The pulse was not as abrupt as the first three, but was steady over a seven-day period and accumulated an estimated total of 340,000 fall chum salmon. No additional significant pulses were detected and the total cumulative run size was estimated to be approximately 2 million for the season.

The first two pulses of fall chum salmon passed through the Lower Yukon Area with little exploitation which was expected to benefit escapement and upriver fishers. Commercial salmon markets were known to be weak and limited to District 1 with no buyers expressing interest in

purchasing salmon in Districts 2 and 3. The first commercial period was opened earlier than previously planned, near the average first quarter point of the run on July 27, to maximize the market potential since the projected surplus exceeded the known available market capacity. The preseason management strategy was to wait until near the midpoint in the run before opening the commercial fishery. However, the abundance of fall chum salmon was apparent from the beginning so the fishery began nearly two weeks earlier than planned. Over 250,000 fall chum salmon had passed through the lower river by that time and the action was intended to help spread out opportunity and harvest impacts throughout the run.

When the third pulse arrived, managers became certain the run would exceed all expectations; escapement and subsistence needs, and all available market capacity. Subsistence fishing time was further liberalized. Because of the frequency of commercial fishing periods, subsistence fishing openings coincided with commercial periods in District 1 to provide more opportunity, but remained closed immediately before and after each period. In upriver districts, subsistence fishing time and commercial periods were both increased concurrently. Fisheries managers worked closely with commercial fish buyers to maximize processing capacity and available transportation opportunities. Periods were planned to avoid the warmest part of the day, which tends to degrade flesh quality rapidly. Commercial fishers in District 1 cooperated well in curtailing their fishing time on two occasions when very high harvest rates exceeded the available processing capacity and on a third occasion when a period was canceled to allow additional time to process a back-log of fish. Buyers and fishers also worked together to improve the quality of their harvest by more careful handling, improved icing techniques, and quicker deliveries. The commercial salmon fishing season in the lower Yukon River normally closes by regulation on September 1, but was extended through September 9 to allow additional opportunity to harvest the abundant fall chum salmon.

Reports of the strong run renewed interests for commercial fishing in other districts. Buyers in Districts 2 and 3 made attempts, but were not able to arrange affordable transportation on short notice. Although there was initial market interest and commercial opportunity was provided in District 4 and Subdistricts 5-B and 5-C, no commercial landings were made. The District 6 fall commercial fishing season began August 26 on a schedule of two 42-hour periods a week with very limited market interest. On September 5, market interest increased and the scheduled period was extended an additional 30 hours in Subdistricts 6-A and 6-B, to increase opportunity to harvest fall chum and coho salmon during the time of high passage rate and good quality. Beginning with the period on September 9, the Subdistricts 6-A and 6-B commercial schedule was lengthened to five-days a week and was followed by an emergency order to extend the commercial fishing season in Subdistricts 6-A and 6-B. However, the fifth period was later extended by 48 hours to increase opportunity because the primary buyer had informed the department they planned to cease operations well before the end of the season. The last three scheduled commercial periods of the season had no reported harvest because there were no markets.

Overall, the exceptionally large run of two million fall chum salmon and moderate harvest level, caused by limited market capacity and low subsistence effort, resulted in a low exploitation rate of 14%. This rate is slightly below the previous ten-year average from 1995-2004 of 19% and well below the ten-year average from 1985-1994 of 39%. In contrast, the amount of commercial opportunity was exceptionally high and subsistence opportunity was very liberal. All escapement goals throughout the drainage including Canadian interim goals were exceeded.

2.2.2 Coho Salmon Management Overview

The coho salmon run was managed to provide for escapement. The commercial harvest was dependent to a large extent upon the abundance of fall chum salmon and accompanying management strategies used to harvest fall chum salmon. The 2005 coho salmon outlook was for a continuation in the trend of above average returns, below average subsistence harvests because of low effort, and an expected commercial harvest of 10,000 to 75,000 fish.

The 2005 coho salmon run timing appeared to be near average based on the run timing at Pilot Station sonar. Test fish projects at Emmonak, Mountain Village, Kaltag, and in the Tanana River provided similar run assessment of magnitude and run timing. The run size estimate at Pilot Station sonar through August 31 was approximately 184,281 fish (Table 2). This number was 35% above the historical average passage estimate of 135,000 fish for the project. Although the Andreafsky weir assessment project in the lower river had a below average passage count, the Delta Clearwater River escapement estimate was above average as were most of the upriver test fishing indices. Pilot Station sonar does not operate for the entire coho salmon run because of expense and many other assessment projects are terminated early because of icing conditions. Therefore, the coho salmon run is not completely assessed.

The preseason market outlook favored coho salmon and the expectation was the allowable fall chum salmon harvest would limit the amount of opportunity to harvest coho salmon as it had in the past. However, by the beginning of the coho salmon run, the fall chum salmon run was near the midpoint and on track for a near-record run. Subsistence fishers of coho salmon shared the benefits of the liberal concurrent fall chum salmon fishing opportunities. Even though there was a large surplus of fall chum salmon available, commercial fishing periods were controlled to spread harvest impacts throughout the run of the smaller coho salmon stock.

As with fall chum salmon, transportation costs were a major limiting factor in the coho salmon fishery. Fish buyers only operated near the transportation hubs in District 1 near Emmonak and Subdistrict 6-B near Nenana. Fishers had to weigh the price of gas in relation to the benefits of potential subsistence and commercial harvests. The extended commercial season and liberalized subsistence fishing time increased fishing opportunity for coho salmon throughout the drainage.

The Delta Clearwater River has the only established escapement goal for coho salmon in the Yukon River drainage, a SEG of 5,200 – 17,000 fish. The 2005 boat count survey estimated an above average escapement of 31,175 coho salmon. The Pilot Station Sonar passage index of 175,000 fish was the third highest since 1995, only behind 2003 and 2004 indicating coho salmon stocks are continuing their trend of above average returns (Appendix A16).

2.2.3 Harvest and Value

Commercial fishing for fall chum and coho salmon has become sporadic because of very poor runs from 1998-2002 with commercial fishing occurring in six of the past ten years. The 2005 commercial season was managed to maximize efficiency and opportunity to utilize the unanticipated large surplus of fall chum salmon. The total fall season commercial harvest included 130,525 fall chum and 36,533 coho salmon harvested in the Lower Yukon Area and 49,637 fall chum and 21,778 coho salmon harvested in the Upper Yukon Area (Table 1). All salmon were sold in the round with no salmon roe sold separately.

The 2005 Alaskan commercial harvest of fall chum salmon was the largest landing since 1995 and the commercial harvest of coho salmon was the largest landing since 1991. The fall chum

salmon commercial harvest of 180,162 was approximately 274% above the 1995-2004 average of 48,200 fish and coho salmon harvest of 58,311 was 215% above the ten-year average of 18,500 fish. However, weak market conditions and limited buying capacity limited the commercial harvest throughout the drainage (Appendix A5 and A6).

The preliminary 2005 commercial fall chum and coho salmon season value for the Yukon Area was $469,378 ($400,491 for the Lower Yukon Area, $68,887 for the Upper Yukon Area). The previous ten-year average value for the Yukon Area was $90,647 ($64,425 for the Lower Yukon Area, $26,222 for the Upper Yukon Area) (Appendix A4).

Yukon River fishers received an average price of $0.32 per pound for fall chum salmon in the Lower Yukon Area and $0.14 per pound in the Upper Yukon Area in 2005. This compares to the 1995-2004 average of $0.19 per pound and $0.13 per pound, respectively. For coho salmon, fishers received an average price of $0.32 per pound and $0.13 per pound in the Lower and Upper Yukon Areas compared to the recent ten-year average price of $0.29 and $0.11 per pound, respectively.

A total of 184 commercial permit holders (177 for the Lower Yukon Area, 7 for the Upper Yukon Area) participated in the fall chum and coho salmon fishery in 2005 compared to the previous ten-year average of 138 permit holders (128 for the Lower Yukon Area, 10 for the Upper Yukon Area) (Appendix A7).

Based on the preseason outlook and indications the fall chum salmon stocks were recovering from low returns observed in 1997–2002, a fall chum salmon commercial fishery was anticipated for the Yukon Area in 2005. However, the magnitude of the 2005 fall chum salmon run was much larger than expected. The primary parent year escapements were among the lowest on record, yet they produced the largest run in 30 years. The 2005 commercial harvest is primarily a reflection of what the market could support because allowable fishing time was well above normal levels and a large surplus remained unharvested resulting in very large escapements. Although the subsistence harvest analysis is in progress at the time of this report, the subsistence harvest is expected to be below average. Decline in both subsistence and commercial harvest effort in recent years is at least in part a result of the series of poor salmon returns before 2003, which has lead to changing subsistence fishing and use patterns and loss of commercial markets.

The 2005 harvest information is not available at this time however total utilization data from 2004 indicated Canada harvested approximately 11,000 Chinook and 10,000 chum salmon compared to the respective long term averages (1961—2004) of 12,000 and 18,000. Total utilization of chum salmon in 2004 indicated the U.S. harvests included approximately 112,000 Chinook and 66,000 chum salmon compared to the respective long term averages (1961—2004) of 134,000 and 249,000. Historical Alaskan and Canadian total utilization of Yukon River Chinook and fall chum salmon is presented in Appendix A8 and Appendix Figure A8.

3.0 COMMERCIAL FISHERY–CANADA

3.1 CHINOOK SALMON

A preliminary total of 4,066 Chinook and 11,931 chum salmon was harvested in the Canadian Yukon River commercial fishery in 2005 (Table 5). The combined species catch of 15,997 salmon was 14.9% above the previous ten-year average commercial harvest of 13,924 salmon.

Since 1997, there has been a reduction in the commercial catch of both Upper Yukon River Chinook and chum salmon because of a limited market and below average run sizes in most years. Canadian Upper Yukon commercial, non-commercial and Porcupine River Chinook salmon harvests for the 1961 to 2005 period are presented in Appendix A9 and similar information for chum salmon is presented in Appendix A10.

Twenty of 21 eligible commercial licenses were issued in 2005. Twenty-one commercial licenses were issued in 2003 and 2004.

The 2005 preseason outlook for Canadian-origin Yukon River Chinook salmon was a below average return of approximately 107,000 fish[1]. An outlook range from 69,600 to 107,000 was used for the 2005 outlook because of uncertainty associated with marine survival of the fish that spawned between 1995 and 2000. The potential for reduced marine survival has been made apparent by the poor total run sizes of Upper Yukon Chinook salmon in the 1998 to 2002 period, which were significantly lower than expected despite healthy brood year escapements.

Key elements of the 2005 Canadian Integrated Fisheries Management Plan (IFMP) for Yukon Chinook salmon as developed by the Yukon Salmon Committee (YSC) were as follows:

i) A target spawning escapement goal of 28,000 Chinook salmon. This goal was consistent with the Yukon River Panel recommendation from the March 2005 Yukon Panel meeting. The YSC recommended allowing First Nation fisheries to occur as long as the spawning escapement was greater than 18,000 Chinook salmon and the First Nation catch was consistent with the Yukon River Salmon Agreement harvest sharing provisions.
ii) Commercial, recreational and domestic fisheries would be given opportunities to fish if inseason run projections indicated requirements for conservation, i.e. the target spawning escapement goal of 28,000, and First Nations harvests would likely be achieved.

Similar to previous years since 2001, the 2005 Integrated Fisheries Management Plan (IFMP) established a series of colour coded categories (Red, Yellow and Green Zones) bound by specific reference points (run sizes into Canada) and were associated with anticipated management actions. For example, the Red Zone included run projections of less than 19,000 Chinook salmon. The anticipated management action for projections falling in the Red Zone would result in all fisheries being closed with the exception of the test fishery. A test fishery would not be allowed if the run projection was less than 11,000. In the Yellow Zone, described as a run size projection in the 19,000 to 37,000 range, only the First Nations fishery and an assessment test fishery would operate. Restrictions in the First Nation fishery would depend upon the run abundance and be increasingly more severe the closer the run projection was to 19,000, the lower end of the Yellow Zone. The Green Zone included run size projections greater than 37,000 Chinook salmon. The anticipated management actions for run projections in the Green Zone include unrestricted First Nations fisheries and consideration for harvest opportunities in the commercial, domestic and recreational fisheries depending on abundance and international harvest sharing provisions.

A total run outlook of 69,600 to 107,000 Upper Yukon Chinook salmon (at the river mouth) and proposed management actions in Alaska suggested border escapement would exceed 45,000

[1] The 2005 outlook of 107,000 was expressed as a range from 69,600 to 107,000 determined from the relationship between forecasted and observed returns for the 1998 to 2003 period.

Chinook salmon which falls in the Green Zone. This number suggested the likelihood of an unrestricted First Nations fishery and fishing opportunities in the commercial, domestic and recreational fisheries. The 2005 season commenced with closures in place for the commercial and domestic fisheries.

Throughout most of June, before Chinook salmon entered the Canadian section of the upper Yukon River, Alaskan test fisheries and the Pilot Station sonar project located near the river mouth indicated to U.S. managers that run abundance was adequate to provide for U.S. border escapement obligations, U.S. subsistence fishing, and a small U.S. commercial harvest. Chinook salmon were first caught in the DFO fish wheels on June 28, the same day as the most recent ten-year average. A total of 1,485 Chinook salmon were caught in the fish wheels, 85.5% of the 1995-2004 average catch of 1,736 fish. In addition to the fish wheels, small-mesh gillnets were fished on an experimental basis from July 10 to August 4, 2005 to augment the number of tags deployed. The gillnet catch was 145 Chinook salmon, 140 of which were subsequently tagged and released.

The primary purpose of DFO fish wheels is to live-capture salmon throughout the run for tagging purposes; fish are tagged and then released. Recoveries of tagged fish, primarily in the Dawson area commercial fishery, are used to estimate the abundance of fish throughout the season. Inseason projections of the total run into Canada, also referred to as "border escapement", are developed by expanding the point estimates of run size generated from the mark-recapture data by historical run timing information. These projections are a key component in Canadian management decisions.

In recent years, the opening of the commercial fishery was frequently delayed in response to conservation concerns. The resulting lack of tag recoveries from the commercial fishery created the need to implement a test fishery to provide stock assessment data for inseason run forecasting. Without tagging data during commercial closures, little else exists to rely upon for inseason run assessment. The option of using just the DFO fish wheel catch has not been exercised because of the poor historical relationship between fish wheel catch and run size estimates. In 2005, information from the US test fishery at Emmonak, the Pilot Station sonar program, and the initiation of a U.S. commercial fishery on the lower Yukon River indicated that the Canadian Chinook salmon escapement target would likely be achieved and a Total Allowable Catch (TAC) would be established. With this in mind, it was apparent First Nation (FN) fisheries would not be asked to undertake conservation measures and fishing opportunities would likely be available within the Canadian commercial, domestic[2] and recreational fisheries. Because of the cost and effort required to mobilize a test fishery, the Test Fishery Steering Committee recommended that instead of a test fishery, a "limited" commercial fishery early in 2005 season should be initiated to determine the status of the Chinook salmon return if managers felt the run would likely be of sufficient strength to meet the spawning escapement goal. Subsequent openings in the commercial and other fisheries would then be determined from the information provided by the limited commercial fishery.

Inseason border escapement run projections were usually produced twice weekly throughout the 2005 season. Early in the season, run size projections were very sensitive to the particular run timing model being used because early timing information represented only a small proportion of

[2] Domestic fishery openings were on the same schedule as commercial fishery openings.

the entire run. Mark-recapture estimates were expanded based on what were considered to be likely timing scenarios (early, late timing, etc.) given information at hand (U.S. fishery and assessment data and early indications in Canada). The intent of applying different expansions was to ensure projections covered an appropriate range of potential differences in run timing. An example of one early inseason projection was a border escapement estimate July 18 of 8,300 projected forward to a total season projection of 41,800 based on historical fish wheel timing data at the tagging site.

The first Chinook salmon commercial fishery operated for a two day period from July 10 to July 12. Eleven fishers participated in the fishery; the highest weekly number of fishers that participated in the commercial fishery. A second two-day commercial fishery opening started at noon July 17. Commencing July 24, weekly fishing periods were increased to four days per week for the remainder of the Chinook salmon season. The peak weekly catch of 1,829 Chinook salmon occurred during the July 24-28 opening. Weekly catch and effort for all openings are summarized in Table 5.

The total catch of Chinook salmon in the commercial fishery was 4,066 fish of which 3,998 was taken in the "Dawson area" fishery, downstream of the confluence of the Yukon and White Rivers, and 68 Chinook salmon were caught in the "upper fishing area" (Table 5).

The Chinook salmon commercial fishery was open for a total of 16 days and total fishing effort was 170 boat-days. For comparison, the previous ten-year average (1995-2004) commercial catch was 4,299 Chinook salmon. This average, however, includes data from 1998 to 2003, excluding 2000, when the commercial fishery was severely restricted or hampered by limited market conditions. The Chinook salmon fishery was closed during the 2000 season and open for only five days in 2002.

3.2 CHUM AND COHO SALMON

The preseason expectation for Upper Yukon River chum salmon was an average return. Spawning escapements in 2000 and 2001, the primary brood years contributing to the 2005 run, were 53,700 and 33,900 chum salmon, respectively. Although spawning escapement was excellent for the 1994 to 1997 period (averaging 116,100 and ranging from 85,400 to 158,100), the cycle year returns from these escapements were well below average and appeared to have been significantly impacted by poor marine survival. Canadian managers surmised that poor survival could once again result in a depressed run in 2005 because of below average escapement in 2001, the dominant cycle year. To capture this uncertainty, the total run outlook was expressed as a range from 59,000 (below average) to 126,000 (average) Upper Yukon River chum salmon. Given the improvement in run size observed in 2003 and 2004 and incidental information that the by-catch of immature chum salmon had been exceptional in the U.S. domestic trawl fishery in 2004, managers thought the upper end of this range was more likely. The Canadian Integrated Fisheries Management Plan for chum salmon in 2005 acknowledged the likelihood of an average return and contained the following key elements:

1) A minimum spawning escapement target of 65,000 Upper Yukon River chum salmon consistent with the Yukon Panel recommendation of March 2005; and
2) Given the expectation for an average run and uncertainty associated with recent returns, the commercial chum salmon fishery would be limited until inseason run projections indicated that the spawning escapement goal and First Nation's requirements would be likely achieved.

In 2005, funding was approved from the Yukon River Restoration and Enhancement fund for a live-release chum salmon test fishery in the Dawson City area to obtain tagging data for population estimates. A similar project was conducted jointly by the Yukon River Commercial Fishing Association and the Tr'ondek Hwech'in First Nation in 2002, 2003 and 2004. Before 2002, projections of chum salmon border escapement were generated either from DFO fish wheel catch data, or from mark-recapture data collected from the First Nation and commercial fisheries located in the Dawson area.

Similar to the decision matrix developed for Chinook salmon, a chum salmon decision matrix was developed in the Integrated Fisheries Management Plan. Red, Yellow and Green management zones were described by specific reference points (run sizes into Canada) and expected management actions. Red Zone included run projections of less than 40,000 fish when closures in all fisheries except for the live release test fishery could be expected. Yellow Zone included run projections in the 40,000 to 68,000 range; within this zone, the commercial, domestic and recreational fisheries would be closed and the First Nation fishery would be reduced with restrictions increasingly more severe the closer the run projection was to the lower end of the Yellow Zone. Green Zone included run size projections greater than 68,000 chum salmon and indicated that First Nation fisheries would be unrestricted and that harvest opportunities in the commercial, recreational and domestic fisheries would be considered depending on run abundance and international harvest sharing provisions. The difference between the escapement goal (65,000) and the trigger point for the Green Zone was 3,000 chum salmon, a total which would fully satisfy the needs of the Canadian aboriginal fishery. Management discretion is used when season projections are close to trigger points.

Chum salmon catches in the DFO fish wheels in 2005 were approximately three times the ten-year average throughout the migration period. Information from the Pilot Station sonar program, the Rampart Rapids mark-recapture program and inseason DNA analyses conducted by the USFWS indicated that the Canadian Upper Yukon chum salmon run escapement target would likely be achieved and a TAC would be established. Given the early indications of strong run abundance, a live-release test fishery was considered to be unnecessary in 2005. A five-day commercial fishery was initiated on August 27. This fishery was followed by six, seven-day openings thus both the commercial and domestic fisheries were continuously open from September 3 to October 15. Despite the liberal fishing opportunities the number of fishers participating in the commercial fishery was very low and no one participated in the domestic chum salmon fishery (Table 5).

The total commercial chum salmon catch of 11,931 fish was 6.8% above the 1995 to 2004 average of 11,170 chum salmon (Appendix A10, Appendix Figure A7). During this period, the catch has ranged from zero chum salmon in 1998 to 39,012 chum salmon in 1995. The chum salmon commercial fishery is somewhat of a misnomer since virtually all of the commercial catch is used for what could be termed personal needs; license holders use most of the catch to feed their personal sled dog teams. This situation could change with the development of local processing capability and a move towards the sale of value-added products such as smoked chum salmon and salmon caviar. No coho salmon were recorded in the commercial catch in 2005.

4.0 SUBSISTENCE, PERSONAL USE, ABORIGINAL, DOMESTIC, AND SPORT FISHERIES

4.1 ALASKA

4.1.1 Subsistence Salmon Fishery

Subsistence salmon fishing activities in the Yukon Area typically begin in late May and continue through early October. Salmon fishing in May and October is highly dependent upon river ice conditions. Fishing activities are usually based from a fish camp or a home village. Extended family groups, representing two or more households, often work together to harvest, cut, and preserve salmon for subsistence use. Some households from communities not located along the mainstem Yukon River operate fish camps along the mainstem Yukon River.

Throughout the drainage most Chinook salmon harvested for subsistence use are dried, smoked or frozen for later human consumption. Summer chum, fall chum and coho salmon harvested in the Lower Yukon Area are primarily utilized for human consumption and are also dried, smoked, or frozen for later use. In the Upper Yukon Area, small Chinook (jacks), summer chum, fall chum, and coho salmon are all important source of food for humans, but a larger portion of the harvested salmon are feed to dogs used for recreation, transportation and drafting activities (Andersen 1992). Most subsistence salmon used for dog food are dried (summer chum salmon) or frozen in the open air "cribbed" (fall chum and coho salmon).

In 2005, all salmon runs were judged adequate to provide for normal levels of subsistence harvest throughout the Yukon Area. In fact, subsistence fishing opportunity in most areas was greatly increased. Subsistence fishing for Chinook and summer chum salmon was seven days a week prior commencement of the BOF window schedule in the lower river on May 30. The regulatory schedule was in place for approximately three weeks and implemented sequentially upriver by predetermined dates consistent with the Chinook salmon migratory timing. As the Chinook and summer chum salmon runs were assessed to have a surplus above escapement needs and for subsistence use, the subsistence fishing schedule was liberalized to provide additional subsistence opportunities and commercial fishing activities were allowed. The inseason management strategy for the fall season was to continue the liberalized subsistence summer fishing schedule during the fall season. This strategy was based on the strong performance of the summer chum salmon run that provided confidence in the 2005 preseason projection that the fall chum salmon run would be more than sufficient to meet escapement goals and subsistence use. Coho salmon abundance was also high and provided for additional subsistence and commercial fishing opportunities. As the fall season progressed, much of the drainage was open seven days per week for subsistence fishing.

Inseason fishers' reports suggested most Yukon Area subsistence fishers probably met their subsistence needs for salmon in 2005. However, reports indicated instances of some fishers throughout the Yukon Area drainage who had to work harder to harvest their salmon. In some interior villages, local conditions were unfavorable for harvesting salmon and work opportunities conflicted with fishing. Other factors that influenced meeting subsistence needs included high price of gasoline, high water levels and debris in some locations, and severe wildfires conditions. Fishers in many villages avoided extensive travel to fish camps because of high fuel cost, and in most cases, waited until the peak of the run occurred in their area before attempting to fish. For the second year in a row, fire conditions in interior Alaska resulted in severe smoke conditions

that made river travel hazardous. Some residents of interior villages located off the mainstem Yukon River, Venetie for example, had difficulties traveling to the Yukon River to fish because of the extreme smoky conditions. Many interior communities were shrouded for most of the summer in a blanket of thick smoke that prevented travel to traditional fishing areas. Other residents who did not fish took advantage of work opportunities on fire-fighting crews for much of the summer.

Postseason subsistence surveys are conducted annually to estimate the number of salmon taken in the subsistence salmon fisheries of the Alaskan portion of the Yukon Area. These surveys are typically conducted through September and October. Approximately 33 villages are visited and fishers from randomly selected households are interviewed based on recent historical harvest patterns. These data are expanded to estimate total subsistence harvest. In addition to postseason interview surveys, subsistence "catch calendars" are mailed to approximately 1,300 households in the non-permit portions of the Yukon River drainage. These calendars augment the survey information, or when households are unavailable to be surveyed, provide harvest information. In portions of the upper Yukon and Tanana River drainages that are road accessible, fishers are required to obtain subsistence or personal use fishing permits. Data collected from these permits are added to the total estimate of the subsistence and personal use salmon harvest. Subsistence harvest totals also include fish from test fisheries given away to residences in communities near the projects. Data compilation is ongoing and the results of the 2005 survey and permit summary will be available in late spring of 2006.

Based on the survey program, an estimated 1,096 households fished for salmon from 31 communities in 2004 (not including the Coastal District communities of Hooper Bay and Scammon Bay) (Busher et al *in prep*). Additionally, 163 subsistence salmon and 35 personal use salmon permits holders fished for salmon. The estimated 2004 subsistence and personal use salmon harvest in the Alaska portion of the Yukon River drainage totaled approximately 53,876 Chinook (Appendix A2), 69,903 summer chum (Appendix A3), 62,436 fall chum (Appendix A5), and 20,965 coho salmon (Appendix A6). Included in the estimated subsistence harvest are 201 Chinook, 231 summer chum, 230 fall chum, and 233 coho salmon taken in the personal use salmon fishery. Also, included in the estimated subsistence harvest are approximately 1,823 Chinook, 2,716 summer chum, 2,378 fall chum, and 801 coho salmon from the various test fish projects given away for subsistence use.

Not represented in 2004 subsistence totals was a significant amount of fall chum and coho salmon carcasses from the District 6 fall season commercial salmon fishery. Commercial processor/buyer purchased fall chum and coho salmon in the round, extracted the salmon roe, and gave away most of approximately 22,000 fall chum and coho salmon carcasses for subsistence use. Because this harvest was already recorded on fish tickets, these fish were not included in the total subsistence and personal use harvest estimates. However, the carcasses were utilized by subsistence users primarily for dog food.

4.1.2 Personal Use Fishery

Fairbanks Nonsubsistence Area, located in the middle portion Tanana River, contains the only personal use fishery within the Yukon River drainage. Subsistence or personal use permits have been required in this portion of the drainage since 1973. Personal use fishing regulations were in effect from 1988 until July 1990 and from 1992 until April 1994. In 1995, the Joint Board of Fisheries and Game reestablished the Fairbanks Nonsubsistence Area, and it has been managed

consistently under personal use regulations since then. Historical harvest data must account for these changes in status. Subsistence fishing is not allowed within non-subsistence areas.

The area known as Subdistrict 6-C is completely within the Fairbanks Nonsubsistence Area, and therefore falls under personal use fishing regulations. Personal use salmon and whitefish/sucker permits and a valid resident sportfish license are a requirement to fish within the Fairbanks Nonsubsistence Area. The individual personal use household permit harvest limit is 10 Chinook, 75 summer chum, and 75 fall chum and coho salmon combined. The personal use salmon fishery in Subdistrict 6-C has a harvest limit of 750 Chinook salmon, 5,000 summer chum salmon, and 5,200 fall chum and coho salmon combined.

In 2005, the personal use salmon fishery followed the regulatory fishing time of two 42-hour periods per week. Data compilation for the 2005 fishing season will not be completed until late spring of 2006. Final results for the 2004 season included 68 personal use salmon permits issued and 35 fishers reported harvesting 201 Chinook, 231 summer chum, 230 fall chum, and 233 coho salmon in Subdistrict 6-C. The personal use harvest is included with the subsistence harvest in Appendix A2, A3, A5 and A6. Additionally, three personal use whitefish and sucker permits were issued in the Fairbanks Nonsubsistence Area and fishers reported harvesting 51 whitefish, 1 sheefish, and 1 sucker.

4.1.3 Sport Fishery

Sport fishing effort for anadromous salmon in the Yukon River drainage is directed primarily at Chinook and coho salmon, with little effort directed at chum salmon. In this report all of the chum salmon harvested in the sport fishery are categorized as summer chum salmon. A portion of the genetically distinct fall chum salmon stock may be taken by sport fishers, however most of the sport chum salmon harvest is thought to be made up of summer chum salmon because: 1) that run is much more abundant in tributaries where the most sport fishing occurs, and 2) the chum salmon harvest is typically incidental to effort directed at Chinook salmon which overlap in run timing with summer chum salmon.

Most of the drainage's sport fishing effort occurs along the road system in the Tanana River valley. From 2000–04 the Tanana River on average made up 85% of the total Yukon River drainage Chinook salmon harvest, 24% of the summer chum salmon harvest, and 67% of the coho salmon harvest. Most Chinook and chum salmon are harvested from the Chena, Salcha, and Chatanika Rivers, and most coho salmon are harvested from the Delta Clearwater and Nenana River systems.

Alaskan sport fishing effort and harvests are monitored annually through a statewide sport fishery postal survey. Harvest estimates are typically not available until approximately one calendar year after the fishing season; therefore the 2005 harvest estimates will be available in the 2006 JTC report. The total sport harvest of salmon in the Alaskan portion of the Yukon River drainage in 2004 was estimated at 1,513 Chinook, 203 summer chum, and 1,623 coho salmon (Appendix A2, A3 and A6). The recent five year (2000–2004) average Yukon River drainage sport salmon harvest was estimated at 1,135 Chinook, 494 summer chum and 1,190 coho salmon (Appendix A2, A3 and A6).

In 2005 there were no emergency orders issued or additional restrictions applied to any of the salmon sport fisheries in the Yukon River drainage.

4.2 CANADA

4.2.1 Aboriginal Fishery

In 2005, as part of implementation of the Yukon Final Agreements (comprehensive land claim agreements), collection of inseason harvest information for the Upper Yukon River was conducted by First Nations within their respective Traditional Territories. Before start of the 2005 fishing season, locally hired surveyors distributed catch calendars to known fishers and asked them to voluntarily record catch and effort information on a daily basis. Interviews were conducted in season to obtain more detailed catch, effort, gear, location and tag recovery information at fish camps or in the community, one to three times weekly. In most cases, weekly summaries were completed by the surveyors and sent to the DFO office in Whitehorse by fax or e-mail. Any outstanding information was obtained post season and reviewed by First Nation staff in conjunction with DFO.

With a below average preseason outlook for Upper Yukon Chinook salmon and an average outlook for Upper Yukon chum salmon, it was not anticipated aboriginal fisheries would be restricted by conservation concerns. Recent harvest levels suggested 2005 escapement goals would be achieved. However, plans were developed whereby aboriginal fisheries would be restricted if required to address conservation concerns. For both Chinook and chum salmon, early run assessment information confirmed conservation concerns were not applicable and First Nations were notified a normal harvest level would be permitted.

Fishers and First Nation staff commented 2005 was a very good fishing season and for the most part, their needs were met. Fishers along the Pelly and Stewart Rivers added many fish camps targeting Chinook salmon closed earlier in the season than usual because of an infestation of yellow-jackets (wasps) in those areas; these insects made fish processing difficult and camp life unpleasant.

The 2005 Upper Yukon Chinook salmon catch in the aboriginal fishery was 6,376, 8.9% below the recent 10-year average of 7,000 and slightly below (1.7%) the 2004 total of 6,483 (Appendix A9). No harvest reports are available for the Whitehorse area and reporting from the Carmacks area is considered to be incomplete.

A total fishing effort for the 2005 Chinook salmon season is not available because several communities did not report fishing effort. Comparative effort information is, however, available from communities where consistent survey methodology was applied. To the middle of August (statistical week 29), effort in the Dawson area Chinook salmon fishery was estimated by Tr'ondek Hwech'in First Nation to be approximately 4,420 net-hours, similar to a total of 4,467 recorded in 2004. In the Mayo area, the estimate of effort provided by the Na-Cho Nyak Dun First Nation was 4,368 net-hours in 2005 compared to 3,048 in 2004. Data provided by the Selkirk First Nation show an estimated effort of 4,978 net-hours in 2005 in the Pelly Crossing area compared to 9,138 in 2004.

The 2005 Upper Yukon chum salmon harvest in the aboriginal fishery was 1,800 (Appendix A10). This total is 15.4% below the 1995-2004 average of 2,127 chum salmon. Participants in the 2005 chum salmon fishery described fishing as being excellent.

Estimate of total fishing effort for the Dawson area during the chum salmon season (Statistical week 30 and later) is 408 net-hours, approximately 30.6% below 588 net-hours logged in 2004.

Detailed effort information was not available for the Pelly or Carmacks area fisheries at the time of writing.

In recent years, a conservation concern has been associated with the depressed Fishing Branch River chum salmon run. In 2005, the Vuntut Gwitchin Government (VGG) submitted a proposal to the Yukon River Restoration and Enhancement Fund to conduct a mark-recapture program on the Porcupine River near the community of Old Crow, Yukon. The main purpose of this project was to develop a tool to quantify the chum run size in season and enable effective local management of the Old Crow area aboriginal fishery. In addition, the Vuntut Gwitchin Government worked with the Yukon Salmon Committee and DFO in developing decision rules to guide harvesting activity at various run sizes and meet minimum escapement thresholds. For example, if the mark-recapture program estimate indicated a low abundance of chum salmon, fishing pressure and allowable harvest would be lowered accordingly. Early in the season, estimates from the mark-recapture program combined with information coming from fisheries and assessment programs conducted in the US portion of the Yukon River indicated that the Porcupine River chum salmon run was better than expected. As a result no restrictions were required in the aboriginal fishery at Old Crow.

Catch estimates for the Porcupine River near Old Crow are determined from locally conducted interviews and by using the catch calendar and voluntary recording system described above. During the chum salmon fishing season, data collection effort was intensive since timely catch and tag recovery information was useful in generating in-river population estimates for the Porcupine River mark-recapture program. Interviews were conducted with individual fishers up to four times weekly. Chinook and coho harvest estimates were derived from the catch calendar information combined with postseason interviews.

A total of 4,593 chum salmon was harvested in the Old Crow aboriginal fishery. This harvest is 17.7% above the recent ten-year average 3,901[3]. Fishing was described as being excellent.

An estimated 394 Chinook salmon were taken in the Vuntut Gwitchin aboriginal fishery, compared to the recent ten-year average of 323. Eleven coho salmon were also harvested, although the complete harvest information for coho salmon is not yet available.

4.2.2 Domestic Fishery

The preliminary estimate of the total domestic fishery catch is 65 Chinook salmon (Appendix A9). Because preseason expectation was for an average run, the domestic fishery did not open until it was determined that more than 28,000 Chinook salmon would likely reach the spawning grounds. This determination was made in early July to allow the fishery to open for two days starting July 10. The domestic fishery was opened for a total 16 days over five fishing periods, in concert with commercial fishery openings. Seven domestic licenses were issued in 2005.

4.2.3 Recreational Fishery

In 1999, the (YSC introduced a mandatory Yukon Salmon Conservation Catch Card (YSCCC) in an attempt to improve harvest estimates and to serve as a statistical base to ascertain the

[3] This average includes below average catches within the 2002 to 2004 period when voluntary restrictions were used to conserve Fishing Branch River chum salmon.

importance of salmon to the Yukon recreational fishery. Anglers were required to report their catch by mail by late fall. Information requested includes the number, sex, size, date and location of salmon caught and released.

Preliminary estimate of the 2005 recreational harvest was 173 Chinook salmon (Appendix A9). An additional 133 Chinook salmon were caught and released. The YSCCC program often involves some data interpretation and censoring which in 2005 involved approximately 7% of data submitted. For example, in 2005 sockeye and coho salmon were reported as a retained catch, however the catch of this species is highly unlikely based on the date and location they were reported to have been caught.

5.0 STATUS OF SPAWNING STOCKS IN 2005

Alaskan and Canadian researchers developed projects to monitor escapement and to determine genetic composition, relative abundances, run characteristics, and other information pertinent to the annual salmon migration. Various government agencies, non-government organizations and private contractors operate projects throughout the drainage (Tables 6 and 7).

5.1 CHINOOK SALMON

5.1.1 Alaska

The 2005 Yukon River Chinook salmon escapement in most tributaries either was within or exceeded goals. This assessment is based on escapement counts and estimates from selected tributaries. Sustainable escapement goals (SEG) for aerial survey assessments have been established for the East and West Fork Andreafsky, Anvik, Nulato and Gisasa Rivers. All aerial survey escapement indices were either within or exceeded their SEGs, except for the Nulato River. Biological escapement goals (BEG) have been established for the Chena and Salcha rivers located in the Tanana River drainage. In 2005, the Chena River Chinook salmon escapement was a minimum of 1,608 fish observed during an aerial survey rated as fair to poor. An estimated 564 Chinook salmon were counted at the Chena River tower project (BEG 2,800-5,700), which was operated only a few days because of high turbid, water conditions. In the Salcha River, Chinook salmon escapement was estimated at 6,021 fish (BEG 3,300-6,500) by the tower project and 5,489 were observed during an aerial survey that was rated as excellent. A summary of escapements can be found in Appendix A11 - A12 and Appendix Figure A9.

Good production from the 2000 parent year continued as was evidenced by a predominance of the 5–year old age class in 2005 and the strong 4-year old age class in 2004. The healthy composition of 6-year old fish returns in the 2005 ASL samples suggests good production from the 1999 brood year (Table 8). Age and sex composition data collected from escapement projects in 2005 are presented in Table 9.

5.1.2 Canada

Preliminary mark-recapture estimate of the total spawning escapement for the Canadian portion of the upper Yukon River drainage is 31,565 Chinook salmon, 3.5% above the 1995-2004 average of 30,505 Chinook salmon (Appendix A13). Results of the Fisheries and Oceans Canada tagging program are discussed in greater detail in Section 6.2.1.1.

Aerial surveys of the Little Salmon, Big Salmon, Wolf, and Nisutlin river index areas were conducted by Fisheries and Oceans Canada (Appendix A13 and Appendix Figure A10). Survey results relative to the previous cycle averages are presented below. Index surveys are rated according to survey conditions. Potential ratings include excellent, good, fair and poor. Surveys ratings other than poor are considered useful for inter-annual comparisons. Historical counts are documented in Appendix A13.

Little Salmon aerial survey was flown on August 12. Count-ability was rated as excellent. The count was of 1,519 Chinook salmon was the second highest recorded for this system; the 1995-2004 average count is 822.

Big Salmon, Nisutlin, and Wolf river index areas were flown on August 15. Fair to good survey conditions were encountered for these surveys. The Big Salmon count of 952 was 77.9% of the 10-year average of 1,222. The Nisutlin River index count of 807 was 2.3 times higher than the 10-year average count of 354. The Wolf River count of 260 was 16.1% higher than the 10-year average count of 224.

Based on observations made in 2002, 2003 and 2004 it may be prudent to continue conducting two surveys of the Little Salmon, Big Salmon, Nisutlin and Wolf river index areas with the first survey taking place no later than August 15. It has become apparent peak spawning is more closely matched to the earliest spawning date chosen in the years when two surveys were conducted. Single aerial surveys do not count the entire escapement since runs are usually protracted with the early spawning fish disappearing before the late ones arrive. Weather and water conditions, the density of spawning fish, and observer experience and bias also affect survey accuracy.

Blind Creek was operational from July 15 to August 15, 2005 when 525 Chinook salmon were counted. A total of 161 fish was sampled for age-sex-length data and 78 of these (48.4%) were female. Previous operation periods and counts are as follows:

- 2004 July 11 to August 15 792;
- 2003 July 31 to August 18 1,115;
- 1999 Aug. 01 to August 22 892;
- 1998- 373; and
- 1997- 957.

Whitehorse Rapids Fishway Chinook salmon count of 2,632 fish, provided by the Yukon Fish and Game Association, was 78.6% higher than the recent average (1995-2004) of 1,474 fish. Overall sex composition observed at the fishway was 19.8% female. Hatchery-produced fish (fish with adipose fins removed) accounted for 57.3% of the return and consisted of 1,247 males and 262 females. Wild fish (fish with adipose fins intact) accounted for 42.7% of the return and consisted of 863 males and 260 females. Historical counts appear in Appendix A13.

5.2 SUMMER CHUM SALMON ALASKA

Data analysis indicates 2005 summer chum salmon escapement levels were above average. The drainagewide minimum optimum escapement objective for the Yukon River of 800,000-1,600,000 fish based on the Pilot Station sonar project was achieved. The Pilot Station passage estimate was 2,442,878 summer chum salmon (Table 2), well above the 1995, 1997-2004 average of 1,412,206 fish.

Anvik River sonar-based escapement count of 557,410 summer chum salmon is within the BEG range of 350,000 to 700,000. The estimated escapement of 20,127 summer chum salmon for East Fork Andreafsky River was below the BEG of 65,000-135,000. Spawning escapements were well above average in the Koyukuk and Tanana River drainages, and Salcha River escapement of approximately 200,000 fish was the largest on record. It appears escapement was lower than average for spawning areas closer to the ocean such as the Andreafsky and Anvik rivers, whereas escapement was much higher for spawning areas upstream of Anvik.

In 2003, concern developed about the relationship between the Pilot Station and Anvik River estimates. The general trend was for Anvik River summer chum salmon estimates to be roughly half of the Pilot Station estimate; in response to a lower percentage of Anvik River escapement relative to Pilot Station in 2003, a pilot program to radio tag summer chum salmon was initiated in 2004. The radio tagging was conducted at the same location as the Chinook salmon radio tagging near Russian Mission. Results showed roughly 30% of summer chum salmon tagged were of Anvik River origin, the same proportion observed in 2003. Surprisingly, it appears a large number of fish ended up in the Bonasilla River, suggesting a population that could be as large as 100,000 summer chum salmon. At this time, the significance of this production shift is difficult to evaluate, except to confirm the relationship between Pilot Station and the Anvik River in 2003 had shifted away from the historic trend.

Escapement monitoring projects are described in Appendix A14 and Appendix Figure A11.

5.3 CHUM SALMON

5.3.1 Alaska

Fall chum salmon runs were very poor from 1998 through 2002. The 2003 and 2004 fall chum salmon runs showed significant improvement over the recent trend of poor production and the 2005 Yukon River run was much stronger than expected. Fall chum salmon parent year escapements that would produce the 2005 return were exceptionally poor, however the run was phenomenal producing the largest return on record. The preliminary Yukon River drainage-wide escapement of 1.8 million is well above the drainage-wide escapement goal range of 300,000 to 600,000 fish.

Although final assessments of overall run size, spawner distribution and age composition are not available at this time, preliminary assessments of run size can be made using several methods. Initially, a considerable amount of weight is placed on the Pilot Station sonar abundance estimate until upriver monitoring projects can provide data. The preliminary fall chum salmon passage estimate, based on Pilot Station sonar for the period July 19 through August 31, was 1,811,762 fish (note SE not available because of using combination Dual Frequency Identification Sonar (DIDSON) and split-beam technologies at site in 2005) (Table 2, Figure 3). One method to determine total run size is based on the Pilot Station sonar abundance estimate with the addition of estimated commercial and subsistence harvests downstream of the sonar site, including test fisheries (approximately 135,000 fish), and an estimated five percent for fall chum salmon that pass into the river after termination of the project (August 31). Therefore preliminary total run size for the Yukon River drainage, primarily calculated from the main river sonar at Pilot Station, is estimated to be approximately 2,038,000 fall chum salmon. Based on the location of the project, in this case Pilot Station (river mile 123), the abundance estimate includes Koyukuk River drainage stocks.

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A second method to calculate run size is by using the individually monitored systems in the upper Yukon and Tanana River including the estimated U.S. and Canadian harvests. For 2005, this method results in a preliminary estimate of 2,081,000 fall chum salmon. This method however does not include escapement estimate of approximately 25,000 for stocks located in tributaries downstream of the confluence of the Tanana River such as in the Koyukuk River. The individual projects are slightly higher than that based on Pilot Station sonar but both represent estimations well above the upper end of the preseason projection based on normal production rates.

The 2005 fall chum salmon run is characterized as the largest run on record only slightly higher than 1975. The run was dominated by 4-year-old fish from the 2001 parent year. The run still experienced typical lulls between the first three pulses but each pulse was substantive and after August 18 fish moved in fairly steady. All of the Lower and Upper Yukon Area monitoring projects provided similar assessments of the record run. The only project that did not reflect the record run in relative abundance was the Subdistrict 5-A test fish wheel, which was having difficulties operating because of changes in water levels and channels however, the project did provide representative timing information.

A review of upper river test fish data and escapement information suggests run strengths of both the upper Yukon River (non-Tanana) and Tanana River run components all benefited from the large return. The USFWS Rampart-Rapids mark-recapture inseason abundance estimate for chum salmon migrating to the Upper Yukon Area was approximately 1,988,000 fish (SE 60,000) through September 16. This estimate was higher than the abundance estimate provided by Pilot Station sonar, which also includes Tanana and Koyukuk River stocks. In 2005 the first strata contained an estimated 200,000 summer chum salmon based on dates of project operation and entry timing (Section 6.1.7). The 2005 Rampart-Rapids estimate represents the largest return followed by an estimated 654,000 fall chum salmon observed in 1996, the first year of the project. Typically a third method of looking at total return to the upper Yukon River drainage is to add Tanana mark-recapture estimates to the upper Yukon mark-recapture estimate. However, in 2005 this method resulted in an estimate over 2,581,000 fall chum salmon, inordinately high compared to the other methods and most likely because of the abundance of summer chum salmon in the first strata and possibly slower migration rates later in the season not being

enumerated by upstream projects that were pulled out at the on set of winter. Details of the Tanana mark-recapture project are presented in Section 6.1.8.

The Chandalar River sonar project ran from August 8 through September 25, 2005. The preliminary escapement estimate was approximately 496,494 upstream fall chum salmon, approximately 3.4 times higher than the 1995-2004 average of 146,488 fish. Chandalar River sonar estimates of fall chum salmon range from a low of 65,894 fish in 2000 to the previous high of 280,999 fish in 1995. The 2005 estimated escapement in the Chandalar River was well above the biological escapement goal range of 74,000 to 152,000 fall chum salmon (Appendix A15, Appendix Figure A12).

The Sheenjek River sonar project operated from August 8 through September 24, ending early relative to passage as substantial numbers of fish (10,000) were migrating on the last day of counts. For the 48-day period of operation the cumulative count at termination was approximately 438,256 chum salmon. This escapement is 4.2 times higher than the upper end of the biological escapement goal range of 50,000 to 104,000 fall chum salmon. In 2005 the Sheenjek River sonar operations were different than in the past in that besides transitioning from Bendix side-scan sonar to split-beam sonar on the right bank from 2002 to 2004 additional testing lead to a switch in 2005 to DIDSON which was operated on both right and left banks. Some of the increase in counts can be explained by the large return in 2005 but additionally preliminary tests between DIDSON and Split beam systems indicated that DIDSON counts are slightly higher. The passage estimates were dominated by the left bank passage through September 5, however once the bulk of the fish arrived the right bank dominated and overall the left bank represented 39% of the cumulative passage estimate. Only right bank data were used in season to compare to historical counts for management and resulted in an estimate of 266,373 fish, which was the largest estimate of escapement on record and 61% higher than the upper end of the BEG range. Historical Sheenjek River escapement estimates, most of which only estimated from the right bank, ranged from 14,229 in 1999 to 246,889 fall chum salmon in 1996 (Appendix A15).

The 2005 inseason monitoring of the Tanana River drainage consisted of estimating fall chum salmon run abundance from mark-recapture techniques (Section 6.1.8). Two population estimates were generated, one in the Kantishna River drainage and the other in the Tanana River drainage (upstream of the Kantishna River). The 2005 upper Tanana River preliminary mark-recapture abundance estimate through September 30 was 318,527 (SE 19,443) fall chum salmon. Upper Tanana River estimates have ranged from a low of 34,844 in 2000 to a previous high of 268,173 in 1995. The preliminary estimate for the Kantishna River drainage as a whole through September 29 was 96,926 (SE 5,856) fall chum salmon. Kantishna River estimates have ranged from a low of 21,450 in 2000 to 87,359 in 2003. Postseason data analysis is ongoing.

The Tanana River established biological escapement goal (BEG) range of 61,000 to 136,000 includes the Toklat River index area BEG range of 15,000 to 33,000 fall chum salmon. To represent the Upper Tanana River, the Toklat River range is subtracted out leaving a BEG range of 46,000 to 103,000 fall chum salmon used to compare with the mark-recapture estimate. In 2005, the upper Tanana River estimated fall chum salmon abundance was 3.1 times higher than the upper end of the goal. The Toklat River, a tributary of the Kantishna River, is an important fall chum salmon spawning area within the Kantishna River drainage and has represented on average 36% of the Kantishna River estimate. The abundance of fall chum salmon in the Toklat River is estimated based on a single ground survey of the index area that was conducted on October 25-27, 2005. Abundance of fall chum salmon was estimated to be 17,779 fall chum

salmon derived from the expansion of stream survey count using the migratory time-density curve. This level of escapement is only 18% above the lower end of the BEG range and represents the lowest ratio of all projects. Several issues contribute to the inordinately low observed escapement including the survey being conducted late relative to peak spawning because of water and channel conditions, heavy predation, snow cover, and the possibility of an early portion of the run being washed out, buried or disintegrated by the time the survey was conducted. The Toklat fish wheels indicated the run to the Toklat River was eight days earlier than average (1997 to 2004).

Delta River, in the upper Tanana River drainage, has a BEG range of 6,000 to 13,000 fall chum salmon. Evaluation of returns to the Delta River in 2005 was based on eight replicate foot surveys conducted between October 12 and December 2. The Delta River escapement was estimated to be 28,132 fall chum salmon based on the area under the curve method. This level of escapement was the second largest on record and 2.2 times higher than the upper end of the BEG range.

5.3.2 Canada

The preliminary chum salmon spawning escapement estimate based on mark-recapture data is 437,746 fish. Details are presented in Section 6.2.1.2.

Aerial surveys of the Kluane and mainstem Yukon index areas were conducted on October 12 and 13, respectively; the Teslin river index area was flown on October 27. All survey dates were approximately one week earlier than the dates these surveys were flown before 2003. The timing of surveys in recent years appeared to occur after the peak spawning period; therefore the 2003 though 2005 survey dates were advanced to better correspond with the peak spawning. The Kluane and mainstem Yukon survey areas both involve a large number of discrete spawning areas (sloughs and side channels) with a range from low to high densities of fish; whereas, the Teslin River index area is a single spawning area.

The Kluane River index count was 34,600 chum salmon, which is 2.9 times higher than the 1995-2004 average of 11,851 fish. A record count of 39,347 chum salmon was observed in 2003 based on a database which goes back to 1973. The index count of the mainstem Yukon River was 16,425 chum salmon; the average count for the 1995-2004 period, excluding 1999 when the area was not surveyed, is 3,882 fish. The Teslin River index count was 585 chum salmon; the 1995 to 2004 average count for this index area is 224 fish. Historical data are presented in Appendix A15 and Appendix Figures A13 and A14.

In the Porcupine River drainage, the Fishing Branch River weir count of 118,690 chum salmon to October 15 was adjusted to 121,413 fish. This adjustment was based on the average cumulative proportion of the run counted to October 15 for the 1995-2004 period. The adjusted count was 4.45 times higher than the 1995-2004 average of 27,275 chum salmon. The 2005 outlook for total return of Fishing Branch River chum salmon return was only 38,200. This outlook, based on an estimated return per spawner value of 2.5, represented a poor return. Escapement counts in the two dominant brood years were a record low count of 5,053 in 2000 and below average count 21,669 in 2001. The pattern of observed returns being lower than forecast returns, evident for the 1998 to 2002 period, was attributed to poor marine survivals. However, observed returns were higher than the preseason outlooks in 2003 through 2005; anecdotal information suggests that there has been improvement in marine survival. Conservation measures implemented by the Vuntut Gwitchin Government (VGG) for the

aboriginal fishery at Old Crow significantly improved escapement to the Fishing Branch River in 2003 and 2004. The VGG endorsed a voluntary closure throughout the chum fishing season in these years. Lost harvest opportunities were offset by a fishery substitution program, which involved the purchase, transport and distribution of dog food[4] to community members for their sled dogs. This program was funded through a Yukon River Restoration and Enhancement Program. The 2005 Fishing Branch River count exceeded the upper end of the interim escapement goal range which is 50,000 to 120,000 chum salmon; this is the first time this has occurred since 1975. Details of the 2005 weir operation are presented in Section 6.2.6.

6.0 PROJECT SUMMARIES

6.1 ALASKA

6.1.1 Yukon River Sonar

The goal of the Yukon River sonar project at Pilot Station is to estimate the daily upstream passage of Chinook and chum salmon. The project has been in operation since 1986. Sonar equipment is used to estimate total fish passage, and CPUE from the drift gillnet test fishing portion of the project is used to estimate species composition. Before 1992, ADF&G used dual-beam sonar equipment which operated at 420 kHz. In 1993, ADF&G changed the existing sonar equipment to operate at a frequency of 120 kHz to allow greater ensonification range and to minimize signal loss. The newly configured equipment's performance was verified using standard acoustic targets in the field in 1993. Use of lower frequency equipment increased our ability to detect fish at long range.

Before 1994, ADF&G attempted to classify detected targets as to direction of travel by aiming the acoustic beam at an upstream or downstream angle relative to fish travel. This technique was discontinued in 1995. Significant enhancements that year included further refinements to the species apportionment process and implementing an aiming strategy designed to consistently maximize fish detection. Because of these recent changes in methodology, data collected from 1995 to 2005 are not directly comparable to previous years.

In 2001 the equipment was converted to the current split-beam sonar system. This technology allows better testing of assumptions about direction of travel and vertical distribution, and to study sediment related attenuation. In 2005, as in previous years, electronic data were collected to explore obtaining passage estimates using computer generated counts, rather than hand counts. Electronic data have the potential to minimize some of the subjectivity associated with employing paper chart recordings and should at the same time reduce operating expenses.

The sonar project was in continuous operation from May 29 through August 31 during 2005. Early in the season the Yukon River experienced high water levels and erosion in the river bottom profile which, along with a combination of changes in fish movement and distribution, affected traditional split-beam sonar detection within 20m of shore on the left (south) bank. On June 19, staff confirmed that a portion of the fish run was passing the site undetected. A DIDSON imaging sonar unit was deployed in this area to supplement estimates generated with

[4] Chum salmon harvested in the Old Crow aboriginal fishery are used primarily to feed recreational dog teams.

the traditional split-beam sonar. The concurrent use of the DIDSON along with the split-beam sonar added approximately 52,000 Chinook salmon, 516,000 summer chum salmon, and 169,000 fall chum salmon to total passage estimates. Overall, this represents approximately 32% of the Chinook, 21% of the summer chum and 9% of the fall chum salmon passage estimates during the entire season. Passage estimates before June 19 are considered conservative.

Fish passage estimates at Pilot Station are based upon a sampling design in which sonar equipment is operated daily in three 3h intervals, and drift gillnets are fished twice each day to apportion the sonar counts to species. In 2005, the sonar equipment was operated continuously for 24h on five occasions: June 18, June 30, July 13, July 27, and August 9. During these expanded operations the normal 3-3h sample periods estimated passage within ±5% of the continuous 24h periods on all but one occasion August 9. On that day an extremely large pulse of chum salmon entered the area and, relative to the 24h counts, the 3-3h counts overestimated total passage by approximately 48%.

An assortment of gillnets, 25 fathoms long with mesh sizes ranging from 7.0 cm to 21.6 cm (2.75 in to 8.5 in), were drifted through the sonar sampling areas twice daily between sonar data collection periods. Drift gillnetting resulted in a catch of 12,135 fish during the 2005 season, including 729 Chinook salmon, 5,499 summer chum salmon, 3,609 fall chum salmon, 900 coho salmon, and 1,398 other species. Chinook salmon were sampled for age, sex, length, girth and weight, and genetic samples were taken from both Chinook and chum salmon. Any captured fish that were not successfully released alive were distributed daily to nearby residents in Pilot Station.

The past season was characterized by above normal streamflow during the first half of June, steadily falling water levels from mid-June through mid-August, and extremely low flow during the last half of August. Erosion of the left bank substrate, occurring in the vicinity of the sonar site, continued throughout this past season. The substrate was unstable throughout most of the summer, with the cutbank advancing past the region where the transducer was typically deployed in previous years. In 2005 the transducer was located approximately 50m downstream of the 2004 deployment site, to the downstream limits of the cabling. For 2006 the entire sonar site will be relocated approximately 200m downstream. As in previous years, the right bank deployment site was consistently stable throughout the summer.

Preliminary passage estimates for 2005 and final passage estimates for 1995 and 1997–2004, as listed in Table 2 were generated using the most current apportionment model. This model, modified from earlier years, was first used for the 2004 season. Historical passage estimates have been revised to allow direct comparison among the years 1995 and 1997-2005.

6.1.2 Chandalar River Sonar

Chandalar River sonar project operated from August 8 through September 26, 2005. The preliminary 2005 escapement estimate is approximately 454,000 upstream chum salmon, and will probably change when final analyses of data are completed. This estimate is the highest estimate documented since this project began and is more than 160% of the next highest estimate of 280,999. Underwater video was deployed to validate the appearance of fish sonar traces when water visibility was greater than half a meter. Analyzing data to determine the trace signature of the whitefish allowed us to the removal of least cisco from the inseason count. Daily passage rates exceeded 10,000 fish for 14 of the 50 counting days. The right bank was shut down for 19 days because of high water, and the ratio estimator method was used to predict the missing count

on the right bank for this time. A final postseason estimate will be available after all analyses are completed and a final report will be available in 2006.

Increased interest in the size of the Chinook salmon run into the Chandalar River has led to a feasibility project to enumerate Chinook salmon. DIDSON was deployed at a site approximately 300 meters upstream of the fall chum split-beam sight. Some advantages of DIDSON are: it can be deployed over a wider range of site conditions then split-beam; it provides a more straightforward visual image that requires less training for technicians; easier setup and deployment than split-beam; and increased potential for species determination. The major limitations of DIDSON include: less range than split-beam; and very large data files. The upstream site was chosen to accommodate the shorter range limits of the DIDSON. The 2005 season was primarily intended to test the ability to operate the DIDSON throughout the entire Chinook season at the selected site, and to evaluate potential complications that could impact the ability to obtain accurate counts, including fish detection ability, species determination, and range distributions.

The DIDSON was operated from 1 July to 1 August. Some difficulties were encountered with deployment and stability of the DIDSON units during moderately high water flows at this site. A preliminary total of 5,591 upstream fish were counted during that time. Since it is known that the fall chum salmon run overlaps with the later portion of the Chinook salmon run, and that chum salmon have been captured with gill nets in the Chandalar River during mid July, there is little doubt that some of the counted targets were chum salmon. Attempts to collect data to help us evaluate the ability to differentiate species were ineffective during 2005. Turbidity associated with higher water flows prevented deployment of video cameras. Furthermore, gill netting and beach seining near the DIDSON locations were hampered by the abundance of large woody debris and strong currents, and catches were very low for all species. Work for 2006 will focus on evaluating the ability to differentiate species and continue to evaluate site conditions and attempt to resolve deployment difficulties.

6.1.3 Yukon River Chinook Salmon Stock Identification

Scale pattern analysis, age composition estimates, and geographic distribution of harvests has been used by ADF&G on an annual basis from 1981 through 2003 to estimate stock composition of Chinook salmon in Yukon River harvests. Three region-of-origin groupings of Chinook salmon, or stock groups, have been identified within the Yukon River drainage. The lower and middle stock groups spawn in Alaskan and the upper stock group spawns in Canada.

In 2004, genetic analysis replaced scale pattern analysis as the primary method for stock identification. Tissue samples were collected from fish in mixed stock harvests from Districts 1 through 5 and paired with age data. Genetic analysis was performed on these samples by age group, age-1.2, -1.3, -1.4, and -1.5; and results from these analyses were combined with specific harvest age composition to provide stock composition by harvest. Age groups not sampled in the harvests, age-1.1, -2.2, -2.3, -2.4, -1.6, and -2.5, were apportioned to stock group using stock composition of analogous age groups, harvest age composition, and escapement age composition. Harvests from the Tanana River, the upper Koyukuk River, and Alaskan tributaries upstream from the confluence of the Yukon and Tanana rivers were assigned to the middle stock group based on geographic location. Harvests occurring in Fort Yukon and above were assigned to the upper stock group under the assumption these fish were bound for Canada.

The historical proportion by stock group in the total drainagewide Chinook salmon harvest (U.S. and Canada) is shown in Table 10. All fish from the lower and middle stock groups were harvested in Alaskan fisheries. Preliminary analysis from 2004 shows drainagewide harvest proportions were: 0.140 from the lower stock group, 0.281 from the middle stock group, 0.488 from the upper stock group in Alaska, 0.091 from the upper stock group in Canada, and 0.579 from the total upper stock group total (Table 10). Comparing 2004 with average (1981-2003) proportions the lower was less, the middle was greater, and the upper was slightly more. In recent years (2002-2004), the middle proportion has a narrow range between 0.281 and 0.292, an above average trend; and the lower proportion has ranged between 0.068 and 0.194, a below average trend.

The Alaskan harvest proportion of fish attributed to lower, middle, and upper river stock groups from 1981 through 2004 is shown in Table 11. The Alaskan harvest proportions from the lower, middle and upper stock groups were 0.154, 0.309, and 0.537, respectively (Table 11). Comparing 2004 Alaskan proportions with average (1981-2003) proportions the lower was less, the middle was greater, and the upper was greater.

Similarly, the harvest proportion of the upper river stock group harvested in Alaskan and Canadian fisheries is shown in Table 12. The proportion of the upper river stock group harvested in 2004 in Alaska and Canada were 0.843 and 0.157, respectively (Table 12). Comparing these 2004 proportions to the 1981-2003 averages, the Alaskan proportion was above average and the Canadian proportion was below average,

6.1.4 Lower Yukon River Chinook and Chum Salmon Genetic Sampling

Chinook salmon –During the 2005 field season, field crews collected genetics samples from Chinook salmon harvested in the U.S. portion of the Yukon River from subsistence, commercial, and test fisheries. Tissues collected during the 2005 field season are axillary processes preserved in ethanol. Actual tissue collections consisted of the following samples: 339 subsistence (District Y1), 3039 commercial (Districts Y1, Y2, and Y5), and 339 test fish harvested at Emmonak. ADFG staff and field crew collected Chinook samples during early June to mid-August.

In District Y4, 939 Chinook salmon were sampled from the subsistence harvest as part of a project funded by the Yukon River Drainage Fisheries Association. This study was designed to compare the stock composition of harvests between shore-based gear and the recently approved drift gillnet fishery. Samples were collected in Kaltag, Nulato, Galena, Ruby, and Bishop Rock.

In addition, 182 Chinook were sampled from fish passing the Eagle sonar site and 200 Chinook were sampled from the Kantishna River for addition to the baseline. Baseline collections from spawning Chinook salmon in the Chandalar and Sheenjek rivers in the United States portion of the Yukon River were not collected. Samples from the upper U.S. portion of the Yukon River drainage are needed to close gaps in the present genetic baseline.

The single nucleotide polymorphism (SNP) baseline of 18 SNP markers was used to estimate the stock composition of the 2004 fishery harvests. This baseline is in the process of being augmented to more than 30 markers. The microsatellite baseline is being finalized and will be applied to the 2005 commercial mixtures. Laboratory analysis of these samples is complete and estimates will be available in February when baseline is finalized.

Chum salmon – ADF&G in cooperation with USFWS collected paired data at Pilot Station from 6112 chum salmon samples during the 2005 field season. The Pilot Station samples were

collected from June 27 to late August from the species apportionment gillnetting at the Pilot Station sonar site. Pilot Station samples will complement the previous sampling over the six-year span from 1999-2004. These 6112 axillary process tissues are archived in ethanol at the USFWS laboratory and a DNA subset will be shared with ADF&G Gene Conservation Laboratory for future genetic stock identification. Fifteen Yukon River chum salmon populations were analyzed as part of a coastwide survey of 31 SNPs developed for use in western Alaska.

6.1.5 Yukon River Chum Salmon Mixed-Stock Analysis

During the summer of 2004, the USFWS, Conservation Genetics Laboratory (CGL) applied an 11 microsatellite baseline to estimate the chum salmon stock composition of Pilot Station Sonar pulses during the fall management season. The DNA baseline was composed of the following stocks: Chulinak River (N=100), South Fork Koyukuk River (N=200), Jim Creek (N=160), Kantishna River (N=161), Toklat River (N=192), Chena River (N=172), Salcha River (N=185), Delta River (N=80), Big Salt River (N=71), Chandalar River (N=225), Sheenjek River (N=150), Black River (N=112), Fishing Branch (N=150), Big Creek (N=100), Tatchun (N=100) Kluane River (N=200), and Teslin River (N=100). Results from this analysis were reported for each pulse and distributed by email within 24-48 hours of receiving the samples at the CGL. Stock abundance estimates were derived by combining the sonar passage estimates with the stock composition estimates. To evaluate the concordance of various data sources, an analysis was conducted to compare these stock specific abundance estimates against escapement and harvest estimates. This analysis revealed that the data are highly concordant.

In 2005, the CGL and the Department of Fisheries and Oceans Canada, Molecular Genetics Laboratory expanded and standardized the baseline, which consisted of 22 microsatellite loci assayed in the following stocks: Andreafsky River (N=261), Chulinak River (N=100), Anvik River (N=100), Nulato River (N=100), Gisasa River (N=200), Henshaw River (N=200), South Fork Koyukuk River (N=200), Jim Creek (N=160), Melozitna River (N=146), Tozitna River (N=200), Chena River (N=172), Salcha River (N=185), Big Salt River (N=71), Kantishna River (N=161), Toklat River (N=192), Delta River (N=80), Chandalar River (N=338), Sheenjek River (N=263), Black River (N=112), Fishing Branch (N=481), Big Creek (N=200), Minto River (N=166), Pelly River (N=84), Tatchun River (N=175), Kluane River (N=462), Donjek River (N=72), and Teslin River (N=143). Beginning on July 1, this baseline was applied to estimate in season the chum salmon stock compositions of the 2005 run from samples collected in Pilot Station sonar test fisheries. Results from this analysis were reported for each pulse or time strata and distributed by email to fishery managers within 24-48 hours of receiving the samples at the CGL. A study to assess the concordance of the 2005 data is ongoing, and preparations are underway to continue the project for the 2006 season.

6.1.6 Chinook Salmon Radio Telemetry Program

Yukon River Chinook salmon radio telemetry program was initiated in 2000 by ADF&G and National Marine Fisheries Service in response to dramatic declines in Chinook salmon returns to the basin. The purpose of the study was to improve management and facilitate conservation efforts by providing information on migratory patterns, distribution and run abundance. Work in 2000-2001 focused on development of capture methods, tracking techniques, and infrastructure necessary for a study of this size and scope. A full scale, basinwide tagging and monitoring program was conducted in 2002- 2004. In addition to efforts by the two lead agencies, support for the project has also been provided by USFWS, Bureau of Land Management, Fisheries and Oceans

Canada, Bering Sea Fishermen's Association, Yukon River Drainage Fisheries Association, National Park Service and organizations funded through the Yukon River Panel Restoration and Enhancement Fund. This study has provided information on run characteristics of Yukon River Chinook salmon, and helped evaluate data provided by other assessment projects within the basin.

Of the 5,755 Chinook salmon captured at the lower river tagging sites during 2002-2004, 2,860 fish were radio-tagged. Most (2,790, 97.6%) fish resumed upriver movement and were tracked to upriver reaches (1,920, 68.8%) or were caught in upriver fisheries (870, 31.2%). Radio-tagged fish traveled an average of 51 km/day, although regional differences were observed with upper basin fish moving substantially faster than lower river stocks. Stock composition estimates indicate Canadian stocks averaged around 50% of the return. Tanana River fish comprised about 20-25% of the return, and were the most abundant U.S. stock. Canadian Yukon River and Tanana River stocks were present throughout the return, but were most abundant during the early and middle run, and fish traveling to lower basin tributaries were more abundant during late June and July. U.S. stocks in the upper basin (upriver of the Yukon-Tanana River confluence) were more abundant than previously thought, with most of these fish returning to reaches of the Chandalar and Sheenjek rivers. Work is continuing on final reports to summarize the combined results from this multi-year study.

In 2005, additional work was conducted on the Tanana River to identify potential tracking station sites in preparation for proposed telemetry studies that would require more refined information on salmon migrations and distribution within this section of the drainage.

6.1.7 Rapids-Rampart Fall Chum Salmon Mark and Recapture Project

Rampart-Rapids tagging study was in operation for approximately seven weeks, from July 28 to September 16, 2005. Similar to previous years of this study, the field crew was stationed at both the Rapids marking site and at the Rampart recovery site. Fish were captured using a north and south bank fish wheel for marking in Rapids and a single north bank fish wheel for recovery near Rampart Village. Mark and recovery sites are separated by a distance of 52 km. Spaghetti tags were applied to 21,072 fish at the marking site. Spaghetti tags were applied through the muscle at the posterior base of the dorsal fin with a hollow applicator needle. To provide a secondary mark for easy video recognition, the entire adipose fin was clipped with a pair of scissors. All marked fish were released directly into the river. Throughout the season, 113,587 fish were examined for marks at the recovery site, and 1,212 of these fish were recaptured with color-coded tags. The resulting fall chum salmon population estimate for the entire season included 1,987,982 (SE 59,797) fish. Weekly estimates of abundance and the probability of recapture, with associated measures of precision, for the 2005 run of Yukon River fall chum salmon were as follows (SE = standard error, CV = coefficients of variation):

		Abundance			Capture probability		
Marking Stratum	Date	Estimate	SE	CV	Estimate	SE	CV
		Strata estimates					
1	28 Jul-5 Aug	197,533	13,887	0.07	0.016	0.001	0.06
2	6-12 Aug	163,553	14,239	0.09	0.015	0.001	0.07
3	13-19 Aug	122,126	12,767	0.10	0.017	0.002	0.12
4	20-26 Aug	514,862	36,039	0.07	0.007	0.001	0.14
5	27 Aug-2 Sept	531,981	41,301	0.08	0.008	0.001	0.13
6	3-9 Sept	184,932	19,407	0.10	0.015	0.002	0.13
7	10-16 Sept	272,995	21,781	0.08	0.009	0.001	0.11

In attempt to reduce the high standard error associated with some weekly strata in previous years, we increased the sample size at the marking site by tagging fish seven days a week instead of six days a week. This increase enabled us to exceed the minimum sample size needed for the desired estimate accuracy range indicated by Federal and State managers.

6.1.8 Tanana and Kantishna River Fall Chum Salmon Mark-Recapture Study

A cooperative fall chum salmon mark-recapture stock assessment project was initiated in 1995 on the Tanana River and has operated annually through 2005. Western Alaska Disaster Relief Grant (WADG) funds were provided to the AYK region as a result of poor salmon runs in Western Alaska in 1997 and 1998. In 1999, WADG funding was used to begin a fall chum salmon mark-recapture project on the Kantishna River. Although funding sources change often, sufficient financial support has provided abundance estimates for both the Tanana and Kantishna Rivers. Present cooperators include the Bering Sea Fishermen's Association, Yukon River Drainage Fisheries Association, and the National Park Service.

The objectives for the 2005 season were to: 1) provide management staff with inseason and postseason abundance estimates of fall chum salmon in the Tanana River (above the mouth of the Kantishna River) and Kantishna River; 2) estimate migration rates of fall chum salmon in the Kantishna River drainage; 3) count tagged and untagged fall chum salmon and other species using digital video at the Tanana tag recovery wheel; and 4) estimate run timing of fall chum salmon to the Delta, Toklat, and Kantishna Rivers.

In the Tanana River tags were deployed from a wheel approximately 9 km upstream of the Kantishna River mouth and recovered (counted using digital video) 76 km upstream. In the Kantishna River tags were deployed from a wheel on the lower Kantishna River and recovered at two sites each with two fish wheels. One site was 139 upstream on the upper Kantishna River and the second was 113 km upstream on the Toklat River tributary. All fish wheels were equipped with a live box, and operated 24 hours a day. A four-person crew deployed tags at the Tanana and Kantishna River tag deployment wheels. Chum salmon were tagged with individually numbered spaghetti tags, and adipose fins were removed from tagged fish to estimate tag loss. In the Tanana River 5,486 fall chum salmon were tagged between August 16 and September 27, 2005. In the Kantishna River 4,070 fall chum salmon were tagged from August 16 through September 24, 2005.

In the Tanana River, the tag recovery fish wheel operated from August 16 through October 3, 2005. A total of 17,087 fall chum salmon were examined of which 274 were tagged. Most tagged fish at this site were viewed using digital video methods. The Toklat River recovery fish wheels operated from August 16 through September 29 on the right bank and August 16 through September 30 on the left bank. A total of 6,233 fall chum salmon were examined, of which 245 were tagged (both wheels combined). Recovery wheels on the upper Kantishna River operated from August 16 through October 9 on the right bank and August 16 through October 4 on the left bank. A combined total of 550 fall chum salmon were examined at the Kantishna recovery wheels, of which 20 were tagged.

Preliminary fall chum salmon abundance estimates are 318,348 (SE 19,432) for the Tanana River and 96,926 (SE 5,856) for the Kantishna River. These estimates are the highest for the Tanana and Kantishna Rivers since inception of each phase of the project. The final 2004 and preliminary 2005 estimates have been updated in Appendix A15.

Delta River abundance estimate, based on the area under the curve method, was 28,132 fall chum salmon. Eight replicate foot surveys of the Delta River were conducted from October 12 through December 2, 2005. During the surveys 85 live fish with tags were counted and 22 were recovered from carcasses. The Toklat Springs abundance estimate, based on a migratory time density curve, was 17,779 fall chum salmon. Foot surveys of Toklat River were conducted October 25-27 which was late relative to peak spawning. Low counts (with respect to the Kantishna River abundance estimate) can be attributed to late timing, predation, snow cover, or washing out, burying and decomposition of carcasses from the early portion of the run. Toklat fish wheel catch indicated the fall chum salmon run was eight days earlier than the 1997- 2004 average. During the survey 79 live fish with tags were counted and 132 tags were recovered from carcasses.

Fall chum salmon age and sex percentages with mean lengths were collected from escapement projects on the Delta, Toklat, Chandalar and Sheenjek Rivers in 2005 Appendix A17.

6.1.9 Ichthyophonus

JTC *Ichthyophonus* Subcommittee was established at the February 20 - 22, 2002 JTC meeting in Anchorage. The subcommittee was formed to develop research recommendations to support individual researchers with project design and to prioritize goals for *Ichthyophonus* research in the Yukon River drainage for the years ahead. YRDFA hosted a meeting October 2004 to discuss *Ichthyophonus* research goals. YRDFA assumed leadership of for future meetings. ADF&G said they would participate but not lead an *Ichthyophonus* committee in the future. Currently, a Sustainable Fisheries Grant ($500K) from the National Oceanic and Atmospheric Administration is funding ADF&G *Ichthyophonus* research. Eric Volk, ADF&G Yukon River Regional Research Supervisor, is the principal investigator and administrator for the grant.

Ichthyophonus is a common pathogen of many species of wild marine fishes. Infection is prevalent in some species, and the organism has caused severe disease and mortality in some fishes such as Pacific salmon and herring. Although initially considered a fungus, it is actually related to Dermocystidium and the rosette agent, choanoflagellate parasites. The infection is systemic within salmon, infecting the muscle, heart, kidney, spleen, and other organs.

Ichthyophonus was first detected in Yukon River Chinook salmon in 1988 (T. Burton, ADF&G, Fish Pathology Lab, Anchorage, personal communication). A pilot study conducted in 1999 indicated approximately 30% of the Chinook salmon sampled in Lower Yukon River in late June were infected with *Ichthyophonus* and samples of Chinook salmon at Tanana showed significant increases in disease severity as they moved upstream (Kocan and Hershberger 1999). Research on the effects on *Ichthyophonus* on Yukon River Chinook salmon has been conducted annually since 1999 (Kocan et al. 2003).

During the 2005 field season, approximately 1,000 Chinook salmon were sampled from three locations, the lower Yukon in Emmonak as the fish enter the river and in the escapements on both the Chena and Salcha Rivers. Sampling methods included heart samples for both explant culture and PCR tests. The escapement samples were collected based on two different criteria in attempts to standardize the sampling. Criteria 1 included clear eyes and some color in the gills and criteria 2 consisted of clear eyes and a firm heart and these fish typically had negligible color in the gills.

The 2005 results indicate the infection rate was higher in the lower river at 24% and decreased on the spawning grounds to 14%. In contrast samples taken in 2004 indicated 22% in Emmonak with mixed infection rates on the spawning grounds. The 2005 infection rates in Chena and Salcha rivers were 36.05% and 13.73% respectively. As in other studies clinical signs of the disease increase as the fish migrate up river as the organism spreads throughout their bodies. As in 2004 infection rates are slightly higher in females than males but they are also the largest component of the run returning as age-6 fish. Based on the 2005 samples by criteria it appears although the heart culture test results can be turned around faster, PCR heart tests were more sensitive and able to detect presence in criteria 2 samples.

Preliminary results from the 2005 samples are summarized in the following table by site and test type, where N = sample size tested, n = number of positive samples, and % = percent infected:

	Heart Culture			Heart PCR		
Sample Site	N	n	%	N	n	%
Emmonak	104	25	24.04	105	25	23.81
Chena River						
Criteria 1	294	34	11.56	300	40	13.33
Criteria 2	23	1	4.35	24	3	12.50
Salcha River						
Criteria 1	297	36	12.12	300	43	14.33
Criteria 2	267	20	7.49	271	31	11.44

An evaluation of spawning success for both males and females was measured based on classification of spawn-out rates including spawned out, partially spawned out, and did not spawn. Female escapement ground samples from 2005 resulted in 44% infected and 43% uninfected classified as spawned out, 10% infected and 6% uninfected were classified as partially spawned out and 1% infected and 2% uninfected were classified as did not spawn. These results are similar to observations in 2004 Chena River samples. Preliminary results based on spawn-out rates of both infected and uninfected individuals suggest Chinook salmon counted past escapement enumeration projects are spawning successfully. As a result, biological escapement goals on the Chena and Salcha rivers will not need to be reevaluated based on an affect from this disease. Although there is some evidence of decreased survival during migration, for management purposes, these mortalities may be considered the same as harvests or drop outs.

Third year of the study will be conducted in 2006 and will concentrate on samples from Emmonak as a baseline and escapements in the Chena and Salcha Rivers.

6.1.10 Eagle Sonar

In 2003, ADF&G began investigating the feasibility of using sonar to estimate Chinook and fall chum salmon passage in the Yukon River near the Alaska/Canada Border. This effort was initiated in response to concerns about the current assessment methodologies and the importance of obtaining accurate border passage information when reviewing whether the annual objectives of the United States/Canada salmon treaties have been met. A suitable section of river was

identified near Eagle, Alaska for a potential sonar project. In 2004, ADF&G carried out a two-week study to evaluate the performance of sonar at two preferred sites, Calico Bluff and Six-Mile Bend (Carroll et al 2005). It was found Six-Mile Bend was the preferred site, a DIDSON™ should be deployed on the shorter, steeper right bank, and a split-beam unit should be deployed on the longer, more linear left bank.

A full-scale project was initiated at Six-Mile Bend in 2005 to estimate Chinook passage. Sonar equipment was deployed on both banks at the site and the project was fully operational from July 12 to August 10, 2005. The preliminary passage estimate for 2005 was 81,527 (SE 353) Chinook salmon. The split-beam and DIDSON™ systems performed well over the entire season with no technical difficulties or malfunctions. DIDSON™ was the ideal system for the right bank, where the profile is steep and slightly less linear than the left bank. The split-beam system worked well on the left bank and appeared to have a satisfactory detection rate nearshore, and still adequately detecting targets out to 150 m.

In addition to operating the sonar, a drift gillnet program was initiated in the same section of river to gain a better understanding of species composition, behavior and spatial distribution of the fish passing during this period. Standard age, sex and length (ASL) data, genetic samples and fecundity information were collected from captured Chinook salmon. Six gillnets, 25 fathoms in length and with mesh sizes ranging from 2.75” to 8.5”, were fished in an effort to effectively capture all size classes of fish present and detectable by the hydroacoustic equipment. A total of 179 Chinook salmon were captured with the drift gillnets: 121 males and 58 females. From July 10 to August 10 the drift gillnets were fished daily for a season total of 853 fathom hours A single whitefish (Coregonus sp.) was also captured. Two chum salmon were caught in a set gillnet that fished for 48 hours beginning August 4. All captured fish were distributed daily to nearby residents.

Though some chum salmon are present in the river during the Chinook run, Chinook and chum salmon runs appear to be largely discrete in time based on local knowledge of catches, data collected in Canada, and past projects in the area. Information from the DIDSON™ also suggest other species such as whitefish appear to be present in very small numbers and for the most part were not usually detected by the split-beam sonar. No chum salmon were caught in the drift gillnets. Chum salmon and non-salmon species such as whitefish are locally known to migrate near shore, so other methods of fishing will be investigated in future years.

6.1.11 Sheenjek River Sonar

The Sheenjek River sonar project has estimated fall chum salmon escapement since 1981 and has undergone a number of changes in recent years. The project originally operated Bendix single-beam sonar equipment, and although the Bendix sonar functioned well, the manufacturer ceased production in the mid 1990’s and no longer supports the system. In 2000, ADF&G purchased an HTI model 241 split-beam digital echosounder system for use on the Sheenjek River to continue providing the best possible data to fishery managers. In 2000 and 2002 the new system was deployed alongside the existing single-beam sonar and produced results comparable to the Bendix equipment (Dunbar 2004). In 2003 and 2004 the split-beam sonar system was used exclusively to enumerate chum salmon in the Sheenjek River.

In 2002, ADF&G began testing a new Dual Frequency Identification Sonar (DIDSON™) for counting salmon in small rivers. Based on the results of these tests, which showed this equipment to be easier to use, more accurate, and capable of operating with substrate profiles unacceptable

for split-beam systems (Maxwell and Gove, 2004), the Sheenjek River was selected as an ideal candidate for this system. In 2004, the project began transitioning to DIDSON™, and in preparation was operated side-by-side with the split-beam sonar on the right bank. The DIDSON™ produced an estimate 29% greater than the split-beam system during this initial testing.

Because of the large discrepancy with the side-by-side comparison in 2004, the DIDSON™ was again operated next to the split-beam in 2005. For the 2005 study, the DIDSON™ produced an estimate 18% larger than the split-beam on the right bank over the period August 18 through September 5. The split-beam sonar was operated at a constant slow ping-rate throughout the season which resulted in lower detection rates after September 5, when chum salmon were observed swimming noticeably faster. This happened to coincide with peak passage for the Sheenjek River, with data collected after September 5 included, the right bank DIDSON™ count was 32% higher than the split-beam. We do not believe this late-season data are representative of the typical relationship since the ping-rate was lower than usual.

Historically, unfavorable conditions for transducer placement on the left bank made only the right bank of the Sheenjek River useful to estimate fish passage. Drift gillnet studies in the early 1980's suggested distribution of the upstream migrant chum salmon was primarily concentrated on the right bank of the river at the sonar site, with only a small but unknown proportion passing on the left bank (Barton 1985). In an effort to estimate the proportion of fish passing on the left bank, a DIDSON™ was deployed there in 2003. The imaging capabilities of the DIDSON™ allows for placement in areas where a steep or uneven substrate, submerged logs or vegetation are problematic for other systems. Results indicated approximately 33% of the fish were migrating up the left bank. Because of large numbers of fish observed on the left bank, ADF&G anticipates operating DIDSON™ on both banks in the future.

The 2005 season marked a successful transition from a single split-beam system on the right bank to DIDSON™ systems deployed on both banks. The project was fully operational from August 10 to September 24. The new equipment was both easier to use and produced more accurate estimates. This is the first year since 1987 chum salmon passage was estimated on both banks of the Sheenjek River over the entire season (Barton 1995). The combined passage estimate for both banks was 438,253 chum salmon, with an estimate for the right bank alone of 266,962 chum salmon. In 2005 the left bank estimates represented 39% of the total passage. It will take several more years of data collection to determine how best to treat the historical estimates, but in order to provide the best escapement number possible the left bank must continue to be monitored. The transition from split-beam to DIDSON has gone very smoothly and this equipment will continue to provide accurate escapement estimates in future years.

6.1.12 Chinook Salmon Age, Sex and Length Analysis of Selected Escapement Projects on the Yukon River

USFWS, Office of Subsistence Management, Fisheries Information Service (FIS) analyzed six long-term (9 or more years) ASL escapement data sets from five Yukon River tributaries: two lower (Andreafsky and Anvik) rivers, three middle (Gisasa, Salcha, and Chena) rivers and one upper (Big Salmon) river. These data sets were obtained from two weir projects (Andreafsky and Gisasa) and five carcass surveys (Andreafsky, Anvik, Chena, Salcha and Big Salmon). Sample size varied among escapement projects and years, data sets contained 9 to 28 years of samples.

To determine whether sex composition, length, age, and length-at-age of Chinook salmon in these spawning escapements have changed over time, FIS staff examined trends in the data sets for changes in

- proportion of female Chinook salmon,
- proportion of large Chinook salmon (greater than 900 mm),
- proportion of 6 and 7-year-old Chinook salmon, and
- lengths of 6 and 7-year-old Chinook salmon.

Results from the analysis were presented in context of basinwide trends.

One basinwide trend was identified, a decrease in the proportion of large (greater than 900 mm) Chinook salmon in most of the sampled tributaries. These data sets represent a small percent of the spawning population over a relatively short time period during which both fisheries and environmental changes have occurred. It is not possible to determine whether the decrease in the proportion of large Chinook salmon was caused by selectivity of the gillnet fishery. Changing environmental conditions could have caused these trends or confounded our ability to discern selectivity effects of the fishery.

6.2 CANADA

6.2.1 Upper Yukon River Salmon Tagging Program (Yukon Territory)

Fisheries and Oceans Canada has conducted a tagging program on salmon stocks in the Canadian section of the Upper Yukon River drainage since 1982 (excluding 1984). The objectives of this program are to provide inseason estimates of the border escapement of Chinook and chum salmon for management purposes and to provide postseason estimates of the total spawning escapements, harvest rates, migration rates and run timing. Spaghetti tags are applied to salmon live-captured in fish wheels. Tagging methodology for many years involved two daily tagging events, morning and evening. In recent years, additional tagging shifts have been implemented for both the Chinook and chum salmon migration periods. In 2005, Chinook salmon were tagged every 6 hours throughout most of the run and chum salmon were tagged three times per day (morning, afternoon and evening) throughout most of the run. Subsequent tag recoveries are made in a number of different fisheries located upstream and infrequently in downstream fisheries and spawning areas. Population estimates were developed in 2005 using spaghetti tag recoveries from the Canadian commercial fishery located downstream of the Stewart River, the area where most intensive fishing activity and catch monitoring is conducted.

Commercial fishers are legally required to report catches, tag recovery and associated data within eight hours after the closure of each fishery. Several potential reporting systems are available for the fishers including a toll-free telephone catch line, hand delivery of the information to the tagging personnel or the deposit of the information in a drop box located in Dawson City. If the telephone option is chosen, fishers are required to deposit their information in the drop box, hand deliver the information, or mail their information no later than 6 days after the fishery closure. In 2005, the Yukon River Commercial Fishing Association was involved in many aspects of data collection including: collection of catch cards from the drop box; electronic entry of the catch and tag recovery information; and payment for tags. Fisheries and Oceans Canada later paid for the tags and a nominal amount for the wages of the person who undertook the assignment.

Consistency in the fish wheel sites and fishing methods permits some inter-annual and inseason comparisons, although the primary purpose of the fish wheels is to live-capture salmon for the

mark-recapture program. Fish wheel catch data in the absence of recapture information are generally not useful to assess run abundance. Fish wheel counts have limited correlation with border escapement estimates derived from mark-recapture estimates, particularly with respect to the Chinook salmon run. Chinook salmon catches tend to be highest during high water conditions when the fish are most vulnerable to the shore-based gear and lower during low water conditions. Similarly, chum salmon fish wheel catches are often directly related to water levels rather than true abundance, although the fish wheels are highly efficient at capturing chum salmon, which appear to migrate close to shore. The fish wheels appear to be less efficient during the later part of the chum salmon migration, late September and early October, a period when the Yukon River becomes less turbid. During this period most fish are caught overnight; there is an assumption migrating chum salmon are better able to avoid the gear during the daylight hours because of water clarity.

Two fish wheels, White Rock and Sheep Rock, are situated approximately seven kilometers apart on the north bank of the river. With the exception of short periods for maintenance or repair, in 2005 both fish wheels ran 24 hours per day for an operational period started June 23 at White Rock fish wheel and June 26 at Sheep Rock fish wheel. Sheep Rock fish wheel was operational until October 5 and White Rock Sheep Rock fish wheel was operational until October 10.

6.2.1.1 Chinook Salmon

The first Chinook salmon was caught in the lower fish wheel, White Rock, on June 28. Combined total fish wheel catch of 1,485 Chinook salmon in 2005 was 85.5% of the 1995-2004 average of 1,736. Sex composition as observed in the fish wheel catches was 31.6% female. A peak weekly catch of Chinook salmon (456) was recorded in statistical week 30, i.e. week ending July 23.

Catch and tag recovery component of the Chinook salmon mark-recapture study used information from the Yukon River commercial fishery downstream of Stewart River.

Chinook salmon border escapement estimate for 2005 is 42,245 with a 95% confidence interval range of 32,970 to 51,520. After subtracting the harvest of 10,680 (4,066 commercial, 6376 aboriginal, 65 domestic and 173 recreational), 31,565 Chinook salmon were estimated to have reached spawning areas. This estimate is 12.7% higher than the escapement goal of 28,000 adopted by the Yukon Panel for the 2005 season (Appendix A13, Appendix Figure A15).

In 2005, information from the DFO mark-recapture program consistently suggested total run size and border escapement projection was consistent with the upper end of the preseason outlook. There was also an indication the 2005 border escapement estimate may have been conservative or biased low; this inference was based on above average catch per unit effort yet low number of tags recovered in the commercial fishery. In addition, information from the sonar program which was occurring downstream near Eagle, Alaska suggested the run was significantly stronger than the mark-recapture program suggested (see Section on Border Sonar). A more intensive commercial fishery with more catch and tag recovery information may have resulted in a higher border escapement estimate. Unfortunately, catch and tag recovery information available to mark-recapture program is often limited.

Comparative border and spawning escapement estimates from the tagging program for 1982 through 2005 are presented in Appendix A13.

6.2.1.2 Chum Salmon

The total fish wheel catch was 13,580 chum salmon, 2.9 times higher than the 1995 to 2004 average of 4,704 chum salmon. The first chum salmon was captured at White Rock fish wheel on July 19; on average over the previous ten years, the first chum salmon has been captured July 23 (range July 6 to August 2). The mid-point of the run occurred on September 13. The average mid-point date over the previous ten years occurred on September 12; however, the mid-point dates have been variable, ranging from September 3 to September 20. The peak weekly catch of chum salmon in 2005 (4,880 fish) occurred in statistical week 38 (September 11 to 17).

In 2005, 7,150 of 13,580 chum salmon captured in the DFO fish wheels were tagged with spaghetti tags. Seven of the tagged fish moved downstream of the tagging sites; one was located in a US spawning area, 2 were observed at the Fishing Branch weir on the Porcupine River and four were recovered in the US fishery located near Eagle Alaska. A total of 52 chum salmon tagged in the US were caught and released from the DFO fish wheels.

Inseason run size information obtained from US Pilot Station sonar project, Rampart Rapids fish wheel, and USFWS DNA analyses indicated the 2005 chum salmon return was unusually strong.

Because of the large number of chum salmon caught in DFO fish wheels, the tagging program involved two separate tag application periods; within the first period, July 19 to August 29, the crew attempted to tag all fish caught; while, in the second period, August 30 to October 10, approximately 50% of fish caught each day were tagged. The intent within the latter tagging period was to minimize impact of crowding and stress on fish caught overnight.

Catch and tag recovery information from the fall commercial fishery was used for the tag recovery component of the chum salmon mark-recapture program. The 2005 chum mark recapture data analysis was made more difficult because of the tag application strategy. Numerous iterations involving temporal stratification were explored before all tagging and recovery data were eventually pooled. The preliminary 2005 Upper Yukon postseason border escapement estimate is 451,477 chum salmon with spawning escapement 95% confidence interval range from 386,496 to 516,458 fish. After subtracting the estimated catch of 13,731 (11,931 commercial and 1,800 aboriginal), the estimated spawning escapement was a record 437,746 chum salmon; the highest estimate previous to 2005 was 158,092 in 1995. This 2005 estimate is 6.7 times higher than the escapement target of 65,000 chum salmon adopted by the Yukon Panel for 2005 and is approximately 5.5 times the rebuilding goal of >80,000 chum salmon. Comparative border and spawning escapement estimates from the tagging program for 1980 through 2005 are presented in Appendix A15.

6.2.2 Big Salmon Sonar

The lower Big Salmon River was surveyed by aircraft on June 4, 2005 to locate a suitable site for the sonar installation and camp setup. The site chosen is located approximately 1.5 km upstream of the Big Salmon/Yukon River confluence. Setup of the sonar station and camp construction was initiated on July 5. All construction materials for the camp, sonar equipment, and the diversion fence were transported to the site by riverboat from Carmacks Yukon. Camp access, crew changes, and supply procurement was also via riverboat supplemented by floatplane from Whitehorse.

Before placement of the DIDSON sonar unit, two diversion fences were constructed on opposite sides of the river to divert shoreline migrating Chinook salmon. These fences were constructed

using prefabricated panels of conduit piping and tripods constructed on site using milled lumber or local material.

The DIDSON sonar unit was installed on a submerged mounting platform constructed of heavy steel pipe. The sonar unit was placed next to the left bank immediately upstream of the diversion fence and secured to the stream bottom using sandbags. The angle and position of the sonar unit was adjusted manually depending on water levels by raising or lowering the adjustable mount.

DIDSON sonar was in place by July 15 and began recording data at 9:00 A.M. the same day. During the initial recording period, various test objects were passed through the area of ensonification by dragging them under a boat. The crew was able to identify objects up to a distance of 35 m.

Sonar imagery was collected and stored continuously in computer files, each of which covered a 20 minute period. Individual Chinook salmon were counted from the stored imagery from files combined into 24-hour segments; data were downloaded onto an external hard drive for permanent storage. A record of the hourly, daily and cumulative counts was entered into computer spreadsheets.

A total of 5,584 Chinook salmon was counted between July 15 and August 23.

The Big Salmon River accounted for 10.4% to 16.4% of the radio tags located during aerial surveys of the Upper Yukon River drainage in 2003 and 2004, respectively. If the contribution of Big Salmon stocks in 2005 was similar to those years, this would place the potential spawning escapement within the 34,000 to 54,000 range.

6.2.3 Whitehorse Rapids Fishway Chinook Salmon Enumeration

A total of 2,632 Chinook salmon ascended the Whitehorse Rapids Fishway between July 29 and September 6, 2005. This total was 78.6% higher than the 1995-2004 average count of 1,474 fish (Appendix A13). Sex ratio was 19.8% female (522 fish). Hatchery-produced fish accounted for 57.3% of the return: 1,247 males and 262 females. Non-hatchery count consisted of 863 wild males and 260 wild females. Run mid-point occurred on August 13 and the peak daily count also occurred on August 13 when 206 fish were counted. A total of 12 male and 6 female mortalities were observed within the Fishway in 2005; an additional 3 fish, which were observed within the structure for a protracted period (i.e. potential mortalities), were used for brood stock.

In 2005, fish were not specifically removed from the Fishway for coded-wire tag sampling, but several samples were obtained from brood stock collected. No weirs (i.e. Wolf or Michie creeks) were operated in the upper drainage upstream of the Fishway in 2005, although more effort was placed on recovery of coded wire tags from Michie Creek and M'Clintock River.

6.2.4 Whitehorse Hatchery Operations

All 112,839 of the Brood Year (BY) 2004 Chinook salmon reared and marked at the Whitehorse Rapids Fish Hatchery were released between May 31 and July 7, 2005. All fish released were marked with an adipose fin clip (Table 13). Fry[5] were released into various locations upstream of the Whitehorse Rapids hydroelectric dam. Numbers of fry released and release location:

[5] The fish released are referred to as fry, however virtually all of them emigrate to the ocean shortly after release, and they may more accurately be referred to as pre-smolts.

Wolf Creek:	17,368
Michie Creek:	45,125
Byng Creek	10,430
M'Clintock River	10,632
Mainstem Yukon River	29,284
TOTAL	112,839

Included in the above numbers were 614 fry considered to be too small or unfit for tagging. These fish had their adipose fins removed (no coded wire tag inserted) and were released in Wolf Creek on July 7, 2005. A summary of releases of Chinook salmon into the Upper Yukon River from in-stream incubation and rearing sites is presented in Table 14.

A small occurrence of "whitefin" was observed on some of the fry before release. Samples were sent to the Pacific Biological Station in Nanamio B.C. for analysis but no casual organisms were found. All fry were deemed good candidates for release.

The 2005 release was the tenth year, 1995-2004 Brood Years (BY), in which all fit fish released from the Whitehorse Rapids Fish Hatchery into the Yukon River were marked. With the exception of all fish released from the 1998 BY (1999 release year), which were adipose-clipped but not tagged, all releases within the 1995-2005 period involved adipose fin removal and application of coded wire tags to all of the fit fish. Approximately 94% of the 1994 BY release was tagged with coded wire tags. The initiative to mark all hatchery releases has provided an opportunity to more accurately determine the contribution of hatchery reared fish as they migrate through the Whitehorse Rapids Fishway and to allow a more selective brood stock program.

Tag retention for the 112,225 fish tagged from the 2004 brood year release was calculated to be 99.2%. This high percentage means an estimated 898 of the tagged fish did not retain their tag. The total 2005 release therefore includes 111,327 adipose-clipped with tags, 898 fish which were estimated to have lost their tags and 614 small (or unfit) fish which were clipped but not tagged for a total release of 112,839.

In August 2005, brood stock collection began after 125 adult Chinook salmon had migrated through the Whitehorse Rapids Fishway. Brood stock was collected from August 5th to August 24. An attempt was made to collect two males for each female during brood stock collection to allow matrix spawning. Matrix spawning has been used for 17 years in an attempt to maintain genetic diversity.

A total of 42 males was retained and used for the brood stock program; 5 of these fish were adipose-clipped (hatchery) and 37 had intact adipose fins (wild). An additional 10 hatchery males and 10 wild males collected from the Fishway were used for brood stock and subsequently released back into the Fishway. In total, 2.9% of the total male return of 2,110 was used for the brood stock program.

A total of 31 females were used for brood stock including: 15 adipose-clipped (hatchery) fish; 13 fish which had intact adipose fins (wild fish); and 3 females (2 hatchery and 1 wild) which were collected after they failed to migrate through the fishway. In total, 5.9% of the total female return of 522 was used for the brood stock program. Egg takes began on August 18 and were completed on August 25. In total, an estimated total of 178,037 green eggs were collected from the 31

females. Average fecundity was estimated to be 5,743 eggs. Fertilization rate was estimated to be 98%. Shocking and second inventory of the eggs began on September 30 and was completed by October 14.

Eggs began to hatch on November 4 and were completed by November 23, 2005 at an average Accumulated Thermal Unit (ATU) value of 530. An estimate of the number of alevins as of January 15, 2005 was 161,843. Approximately 160,000 fry were ponded in late January to early February 2006.

6.2.5 Porcupine River Investigations

6.2.5.1 Fishing Branch River Chum Salmon Weir

A weir established to enumerate chum salmon escapement to the Fishing Branch River has operated annually since 1985, except for 1990. Before 1985, a weir was operated during the 1972 to 1975 period. Since 1991, Fisheries and Oceans Canada and the Vuntut Gwitchin Government First (VGG) have conducted the weir program cooperatively. Escapement estimates for the Fishing Branch River, including aerial expansions for years lacking complete weir counts, have ranged from approximately 5,100 chum salmon in 2000, to 353,300 chum salmon in 1975 (Appendix A15, Appendix Figure A14).

In 2005, the weir was in operation from August 20 to October 16 during which time a total of 118,699 chum salmon was counted. However, this count was considered to be incomplete since historically, a small proportion of the run is known to migrate after October 16. To account for later migrating fish, the count to October 15 (118,690) was adjusted based on the average cumulative proportion of the run which occurred after this date within the 1995-2004 period. This gave an adjusted estimate of 121,413 chum salmon (Appendix A15).

Peak daily count (5,906 chum salmon) occurred on September 23 and the mid-point of the run on September 17. The expanded 2005 count (121,413) was 4.45 times higher than the recent 10-year average of 27,275 chum salmon and was 1.2% higher than the upper end of the interim escapement goal range of 50,000 to 120,000 chum salmon. Weir counts in the dominant cycle years were 5,053 chum salmon counted in 2000 and 21,669 chum salmon counted in 2001.

Generally, a low number of coho salmon are observed at the weir each year. However, the weir is not in place long enough to obtain quantitative information on coho salmon escapement. No coho were counted in 2005.

6.2.5.2 Porcupine River Chum Salmon Conservation Concern

A conservation concern for the Porcupine chum salmon return existed heading into the 2005 season. This concern was based primarily on brood year escapements to the Fishing Branch River. The 2000 Fishing Branch weir count (5,053 chum salmon) was a record low count and a below average count of 21,669 chum salmon was recorded in 2001. Based on an anticipated return per spawner value of 2.5 and a weighted brood year escapement of 15,300, the 2005 outlook for the Fishing Branch River was only 38,200 chum salmon. The 2005 outlook for the Fishing Branch River was a below average return which fell below the lower end of the escapement goal range of 50,000 to 120,000 chum salmon. The JTC discussed a number of rebuilding options for the 2005 Fishing Branch River escapement target. With an outlook of only 38,200, the lower end of the escapement goal was not expected to be achieved. The available options ranged from a Total Allowable Catch (TAC) of 0 to the provision for some fishing

opportunities to US and Canadian fisheries and target escapements ranging from 24,000 to 33,000. Fortunately, it became apparent early in the 2005 fishing season the 2005 Porcupine chum salmon return was much higher than the preseason outlook.

The Vuntut Gwitchin Government (VGG) was interested in conducting their aboriginal fishery on the Porcupine River chum salmon stocks in 2005. After 3 years of conservation efforts, the VGG believed the 2005 run would support some aboriginal fishing opportunities near the community of Old Crow. With this in mind the VGG did not pursue a voluntary fishing closure with a "substitution program" administered under the Yukon River Panel Restoration and Enhancement Fund. In 2003 and 2004 a "substitution program" was used to purchase and transport sled dog food as a substitute for the forgone harvest of chum salmon. The Old Crow aboriginal fishery typically harvests 5,000 to 6,000 chum salmon each year.

6.2.5.3 Porcupine River Chum Salmon Mark-Recapture Program

A mark-recapture program, funded by the Yukon Restoration and Enhancement Fund, was conducted on the Porcupine River near the community of Old Crow, YT, in 2005 by the VGG and a consulting firm, Environmental Dynamics Limited. The purpose of this project was to develop an inseason chum salmon management tool for the community of Old Crow and Fisheries and Oceans Canada fishery managers. Collaborators hoped inseason information from this program and the Fishing Branch River weir could be used to determine harvest opportunities and promote conservation of the Fishing Branch chum salmon return.

In 2005, 3,574 chum salmon were captured by gillnet, tagged, and released downstream of the community of Old Crow. A total of 1,904 chum salmon was caught in a test fishery and 52[6] of the tagged fish were observed. Weekly mark-recapture estimates were developed throughout this program as well as a total estimate of 128,497 (95% CI 94,869 to 162,124). The table below shows an estimation of the number of chum salmon passed Old Crow during the mark-recapture program (includes only recaptures from test fishery).

Week	n1 # tagged	n2 (# test)	m2 (tags recovered)	Nc (Chapman's Estimate)	Var (Nc)	95% CI	Run Est (-)	Run Est (+)
1	651	254	8	18,472	32467499	11,197	7,276	29,669
2	436	276	5	20,174	56105731	14,719	5,455	34,892
3	605	116	2	23,633	135387369	22,864	769	46,497
4	1,156	517	9	59,932	317466251	35,012	24,920	94,943
5	658	623	26	15,229	7601090	5418	9,812	20,647
6	68	118	2	2,736	1746206	2597	139	5,333
TOTAL	3,574	1,904	52	128,497	292857170	33627	94,869	162,124

One limitation of this program was the relatively low number of tag recoveries (52) observed in the test fishery catch. Since additional catch and tag recovery information was available from the aboriginal fishery, centered in close proximity to the community of Old Crow, catch and tag recovery information from this fishery was added to existing data and an independent population estimate was calculated. Combined data included an examined catch of 5,995 and 188 associated

[6] Test fishery tag numbers were recorded and tagged fish released with their tags intact whereas the aboriginal catch and associated tags were retained.

tag recoveries. The aboriginal catch used in the combined data (n=4,091) excludes the catch, which was made before and after the tagging program. The total estimate using the combined fishery data was 113,415 (95% CI 97,930 to 128,900). The table below shows the estimation of the number of chum salmon passing Old Crow during the mark-recapture program (includes recaptures from test fishery and VGG aboriginal fishery).

Week	N1 # tagged	n2 (# test)	m2 (tags recovered)	Nc (Chapman's Estimate)	Var (Nc)	95% CI	Run Est (-)	Run Est (+)
1	651	579	12	29,088	57908827	14,953	14,135	44,041
2	436	1,120	21	22,266	20070567	8,803	13,463	31,069
3	605	1,251	53	14,049	3128403	3,476	10,574	17,525
4	1156	1,976	66	34,139	15600603	7,761	26,378	41,900
5	658	951	34	17,924	8140249	5,606	12,317	23,530
6	68	118	2	2,736	1746206	2,597	139	5,333
TOTAL	3,574	5,995	188	113,415	62101093	15,485	97,930	128,900

The preceding estimates attempt to quantify all populations of chum salmon within the Porcupine River upstream of Old Crow. Based on tag recovery information presented, there were 3,438[7] tags at large; however, the Old Crow aboriginal catch recorded outside the test fishery program may have included additional tag recoveries.

A total of 2,424 tags applied near Old Crow were recovered (1,946) or observed (478) during operation of the Fishing Branch weir in 2005; this total represents 70.5% of the tags which were assumed to have moved upstream of Old Crow. Fishing Branch weir count to October 15 (118,690) was adjusted to a total season count of 123,413 based on 10-year average timing.

6.2.5.4 Porcupine Coho Telemetry Program

Twenty-five coho were tagged with radio transmitters near Old Crow, YT in early November. All fish were caught with gillnets fished under the ice. The tags were applied only to the fish which were in good condition. Nine female and 16 male coho of various sizes were tagged. Preliminary results based on the first aerial tracking survey conducted in late November indicate most of the fish (23) were migrating upstream in the Porcupine mainstem or holding within Fishing Branch River. It is thought most of the fish migrating in the Porcupine mainstem are destined for the Fishing Branch River. One tag was located immediately downstream of the tagging site and was thought to have been regurgitated and one tag was not located. A final aerial tracking survey will be performed in mid-January in another attempt to locate the transmitters.

6.2.6 Yukon Education Program 2004-2005

In 2004 - 2005, Fisheries and Oceans Canada continued to support the educational program, called "Salmon in the Classroom" and has been renamed “Stream to Sea”. Lesson aids supporting the program are available to all Yukon schools, through the Learning Resource Centre, and through DFO. DFO provides incubation equipment and small numbers of salmon

[7] The 52 tags observed in the test fishery were redeployed

eggs to Yukon schools. In 2004-2005, salmon eggs were incubated in 17 aquaria in six Yukon Communities as part of this program. Chinook salmon eggs from the Takhini River, Tatchun Creek, and Morley River were incubated to the eyed stage at the McIntyre Creek salmon incubation facility, which Northern Research Institute (NRI) has administered since 2002. Overall egg-fry survival of 520 Takhini and 60 Tatchun River eggs was 84%. Overall egg-fry survival of the 150 Morley River eggs was only 40%, caused by overfeeding problems at one school. Seventy-two percent of the 500 Kluane River chum eggs survived, despite one school losing all but alevins when their chiller was unplugged over the Christmas holiday.

Seventeen Yukon schools are incubating (or plan to incubate) salmon eggs from the Takhini River, Tatchun Creek, Morley River and Kluane River Chinook and chum salmon brood stock collected in 2005. The Northern Research Institute will continue to operate the McIntyre Salmon Incubation project during the 2005 to 2006 season. A small class of Yukon College Renewable Resources students is taking a series of workshops related to the project. The NRI is employing one of these students as student manager for the McIntyre project, and also hires several students to carry out site monitoring and maintenance of the facility.

6.2.7 Chinook Salmon Habitat Investigations

6.2.7.1 Croucher Creek: Juvenile Chinook Salmon/Beaver Interactions

Juvenile Chinook salmon migrate into and ascend small streams in the Upper Yukon River Basin. These streams are rearing and overwintering habitat. Beaver dams may obstruct access to these habitats. Concerns have been raised by various groups regarding the need for beaver management to allow fish access to habitats located upstream of beaver dams. To address these concerns, investigations were conducted in the lower 2.0 km of Croucher Creek, near Whitehorse by DFO Oceans, Habitat and Enhancement Branch (OHEB) staff.

A pilot investigation commenced in 2004. The primary finding of this investigation was the speed at which beaver may modify streams: in less than two months, two beaver colonies were established in the study area. Two primary dams (each containing a beaver lodge) and 10 secondary dams (without lodges) were constructed. The impoundments had a total length of about 450 meters, about 25% of the study area. High densities of young-of-year (age 0+) juvenile Chinook salmon captured downstream of the larger dams, and few captured in the intervening areas implies upstream migration of age 0+ salmon was at least partially obstructed.

Beaver activity was monitored over the winter of 2004/5. Both colonies survived. Two secondary dams failed, and were not rebuilt in the summer of 2005.

In 2005, Chinook salmon sampling commenced on May 28. The upstream migration of young-of-year Chinook salmon was delayed for approximately 2 weeks by the furthest downstream beaver dam (500 meters upstream from the mouth). This dam likely delayed individuals entering the stream throughout the open water season. Concurrent with monitoring effects on the upstream migration, timing of the out-migration of age 1+ Chinook salmon and in-migration of the age 0+ Chinook salmon was determined. Sampling suggested age 1+ out-migration peaked on May 31, 2004 and was functionally complete by mid-June. This timing was similar to 1993 and was about 3 weeks earlier than in 1999 when the migration extended from June 7 to July 4. Age 0+ Chinook were consistently captured at the same site from June 2 onward. This date was about 2 weeks earlier than in 1993, when age 0+ juveniles were first captured on June 16 and

about 3 weeks earlier than in 1999 when juveniles were first captured at the mouth of the creek on June 15.

The creek is downstream of all releases from the Whitehorse Rapids Hatchery. No hatchery-origin fish were found in a total of 2,284 Chinook salmon examined for hatchery marks.

In October, one beaver colony appeared to be deserted, and one new colony had been established.

6.2.7.2 Klondike River Ground Water Channels: Juvenile Chinook Salmon Utilization

Ground water channel development is a primary method for salmon habitat enhancement/stock restoration in the US Pacific North West/Canadian Pacific South West. This method has been applied on a single project within the Yukon River Canadian sub-basin. An intermittently flowing side channel downstream of a hydro-electrical dam was deepened to provide additional habitat during low flows. The regulated nature of the river does not reflect natural flow regimes. There are concerns that findings from the monitoring of this project may not be applicable to other areas with non-regulated flows. To address these concerns, DFO OHEB staff initiated monitoring of two ground water channels near Dawson City. Pilot investigations were conducted in the summer of 2004 and over the winter of 2004/2005.

Samples collected in 2005 implied little use of ground water channels in early July. Juvenile salmon moved into the channels over summer and autumn. Upstream migration appears to have continued throughout early winter; highest densities were observed in late December at the head of the channels.

Thermographs have been located in each channel and will be downloaded during summer of 2006.

6.2.7.3 Mickey Creek: Long-term Effects Of Forest Fires On Salmon Habitats In Un-glaciated, Permafrost Dominated Landscapes

Effects of forest fires on aquatic habitats in the temperate regions of North America are relatively well known. Little research has been carried out in permafrost-dominated landscapes. Essentially no research has been conducted in the non-glaciated areas of the Yukon Plateau in central Yukon Territory.

During the summer of 2004 most of the watershed of Mickey Creek, a small tributary of the Fortymile River near Dawson City was burned. Short-term effects to lower Mickey Creek appeared to include increased stream flows (presumably caused by a decrease in evapo-transpiration) and turbidity.

On the advice of DFO OHEB staff, the Yukon Geological Survey (YGS) conducted an overview of the area as part of a planning exercise to choose a watershed for more detailed study into the effects of forest fire on land surface stability. As of mid-July 2005, YGS staff had documented more than 70 landslides within the 63 square kilometre watershed directly attributable to the 2004 forest fire.

Limited water quality and fish sampling was conducted by DFO OHEB staff at various times through the open water period. The immediate area of the creek received very little rainfall and there was limited downstream migration of sediments.

Further sampling will continue in the future. Other government agencies will be encouraged to conduct research in the drainage.

6.3 RESTORATION AND ENHANCEMENT FUND

6.3.1 Status of R&E Projects 2005

Project No.	Project Title	Contractor	Funding $US/Cdn	TC[8]

URE-06-05 Kaltag Fall Chum/Coho Gillnet Test Fishery City of Kaltag $20,500/25,600 S

Project satisfactorily conducted, final report approved – project completed.

URE-09-05 Rampart Rapids Full Season Video Monitoring Stan Zuray $32,200/40,000 S

Project satisfactorily conducted, final report approved – project completed.

URE-l4-05 Ichthyophonus Diagnostics, Education & OutreachYRDFA[9] $30,000/37,500 S

Project successfully launched, with focus on communication along the US section of the Yukon River and in Dawson City/Moosehide, with other outreach in YR Canadian to be transferred to a 2006 project. Project final report extended to June 2006 in consideration of changing personnel involved and logistical considerations.

CRE-07-05 2005 'First Fish' Youth Camp Tr'ondeck Hwech'in First Nation $2,800/3,500 A

Project successfully completed with final report in preparation – expect to be completed end of March 06.

CRE-ll-05 Inseason Management Fund & Test Fisheries YRCFA ($40,000/50,000) P/R

This is a Panel R&E 'contingency project' (i.e. to be launched if needed); in 05, as occurred in 04, prepared for, but not activated as test fisheries were not required due to strength of the runs resulting in authorized aboriginal and commercial fisheries in Yukon which were monitored for this data otherwise collected from these R&E test fisheries. Project financials currently being concluded with the result of minimal expenditure (approximately $2,000 to gear up for the project), with the remainder of the funding being de-committed.

CRE-l3-05 Chandindu River Weir Demobilization YRCFA $4,000/5000 P-R

Project completed, with ongoing storage expense to be incurred by the Panel pending re-deployment of this weir.

CRE-18N-05 Coho Radio Tagging/Telemetry Pilot Project Vuntut Gwitchin FN $41,300/51,600 P-R

Project successfully conducted and on schedule; draft final report in preparation; and, anticipate completion of project March 06.

CRE-19-05 Lower Mayo River Chin & Channel Assessment NNDFN[10] $16,000/20,000 A

Project satisfactorily conducted, draft final report has been reviewed with revisions currently in progress – expect completion March 06.

CRE-27-05 Chum Mark/Recap Test Fishery-Porcupine Riv Vuntut Gwitchin FN $53,800/70,300 P-R

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[8] Technical Contact – S/Susan McNeil (ADF&G), A/Al von Finster, PR/Pat Milligan, Rick Ferguson, S/Sandy Johnston – DFO, H/Hugh Monaghan – YR Panel Secretariat.

[9] Yukon River Drainage Association (AK)

[10] First Nation of Nacho Nyak Dun (Mayo area, Yukon - Stewart River System)

Project successfully conducted and final report approved - project completed.(Project cost was increased by $3,000 in consideration of unpredictable incremental costs approved, hence total project contract cost as above.

CRE-29-05 Chum Spawning Ground Recoveries -Minto Area Selkirk RRC[11] $9,600/12,000 P-R

Project successfully conducted and final report approved - project completed.

CRE-31N-05 Pelly River Sub-Basin Community Stewardship Selkirk RRC $16,000/20,000 A/P-R

Project successfully conducted and final report approved - project completed.

CRE-36N-05 Community Based Stream Assessment LSCFN[12] $12,000/15,000 A

Project completed and draft final report reviewed, awaiting 'clean up', sought by end of March 06.

CRE-37-04 Blind Creek Chinook Salmon Enumeration Weir Jane Wilson $37,400/49,200 P-R

Project completed, progress report approved; final report currently being reviewed; and, expect completion end March 06.

CRE-41-04 Chinook Sonar Enumeration Big Salmon River Jane Wilson $64,800/86,700 P-R

Project completed, progress report provided, draft final report reviewed, completion of project expected end of March 06.

CRE-47-04 Teslin River Sub-basin Community Stewardship Teslin Tlingit Council $38,200/47,700 A

Progress report accepted; final report currently being reviewed; and, expect final report end of March 06.

CRE-50-04 McClintock River Watershed Salmon Mngmt. Kwanlin Dun FN $24,000/30,000 A/P-R

Plan Project completed; delay in data analysis by subcontractor; with, pending final report end March 06.

CRE-53N-05 Range Road dump Stabilization/Clean-Up Ta'an Kwach'an FN $12,800/15,000 A

Project successfully conducted and final report approved - project completed. (This project was originally approved in the amount of $27,700/34,600, but the project was modified/reduced in consideration of inseason logistical and secondary project support considerations to achieve that which was achievable for 05/06 and to advance a limited completion project for 06.

CRE-55-04 Upper Nordenskiold Salmon Stewardship Champagne & Aishihik FNs ($5,200/6,500) A

Project completed and final report approved. (Note: project cost reduced with limit of this project to removal of data loggers totaling $2-3k, with remaining project budget de-committed.)

CRE-58N-05 Community Salmon Stewardship Kluane First Nation $12,800/16,000 A

This project was modified from the initially approved project in consideration of both change in logistical and project stewardship and leadership considerations, with the result of this project being reduced in amount from the approved $24,000/30,000 by approximately half, and the project being extended to the spring of 06 to include relieving stranded fingerling chum salmon. Project launched and final report anticipated June 06.

CRE-61N-05 Chinook Fry Release–Whitehorse Rapids Hatchery R&D Env Mngmt $4,800/6,000 A

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[11] Selkirk Renewable Resources Council (Pelly Crossing area - middle mainstem of the Cdn section of the Yukon
River, including Pelly River)

[12] Little Salmon Carmacks First Nation (Carmacks area, Yukon)

Project completed, and final report approved.

CRE-62N-05 Educ/Interpt Displays Whitehorse Fishway R&D Env Mngmt $4,000/5,000 P-R

Project completed, and final report approved.

CRE-63N-05 Whitehorse Rapids Hatchery CWT & Fisheries YF&GA[13] $48,000/60,000 P-R

Project successfully conducted and final report approved – project completed.

CRE-65-05 McIntyre Creek Salmon Incubation Project Yukon College-NRI $34,500/43,100 A

Project proceeding on target with progress reports, and final report due end of March 06.

CRE-67-05 Yukon Schools Fry Releases & Habitat Studies Streamkeepers North Soc $3,200/4,000 A

Project on target with final report due May 06.

CRE-75-05 Yukon River Salmon Cooperative YR Salmon Coop $120,000/150,000 S/R/H

This project is on target with the Coop having advanced in response to the initial due diligence review by the Panel. The YRSC has since refined its business plan, and conducted initial partnership discussions in consideration of further R&E project committee discussion, including most recent review with Panel's committee legal counsel. (Note the Panel's committee due diligence reviews is being charged to Panel project administration funds.)

CRE-87a-05 Germaine Creek Demonstration Restoration Project M Miles &Assoc $17,200/21,500 A

Project successfully completed with approved final report.

CRE-89N-05 Salmon Boreal Forest Ecosystem Tracer Salmon M. Bradford/DFO $17,600/22,000 A

Project report final draft in development, project anticipated completion end of March 06.

CRE-95-05 Yukon Queen II Yukon River Panel ($8,000/10,000) A/P-R

Project expenditure not activated pending current year and longer term joint commitment direction to be determined for this project.

CRE-97N-05 Porcupine River Salmon Gathering Vuntut Gwitchin First Nation $9,600/12,000 A

Project successfully completed; and, final report provided and approved.

CRE-98N-05 Yukon Stewardship Yukon Fish & Wildlife Management Board 104,000/130,000 A/S/H

Project progress reports approved; project on schedule; with, final report to be received end of March 06.

CRE-104-05 Yukon Fisheries Field Assistant Program Yukon College-Teslin $52,800/66,000 S/P/H

Project successfully implemented and final report currently being reviewed; additionally, within this project budget the completion of the 'Yukonization' of this course is being developed in consultation with YRP review committee.

CRE-110-05 Canadian Escapement Sampling (Didson Sounder Testing) Contractors $30,900/36,400 P-R

Project successfully conducted; with, final report approved.

US/Cdn Stock ID Projects

Both (ADF&F - $86.6kUS and DFO - $78.8Cdn) activated with final report due end of March 06.

US (ADF&F) & Cdn (DFO) R&E review/support

[13] Yukon Fish and Game Association

Both activated ($20US & $85Cdn respectively), with final reporting due end March 06.

6.3.2 Call for 2006 Project Proposals

YUKON RIVER RESTORATION & ENHANCEMENT FUND

Relating to Salmon of the Yukon River System of Canadian Origin

Conceptual Proposals are due October 11, 2005

- Response to this call for conceptual proposals is the first essential step for applicants to the Yukon River Panel's salmon restoration and enhancement (R&E) fund in 2006.
- Panel R&E funds are committed to research and management projects directed to the restoration and enhancement of salmon stocks of Canadian origin in the Yukon River watershed in Yukon and Alaska; and, to develop community-based stewardship for salmon and their habitats, and to maintain viable salmon fisheries in Yukon.

Yukon River Panel's R&E Program

- The Yukon River Panel is mandated by the U.S.A./Canada agreement on Yukon River Salmon (March 29, 2001) enabled by the Pacific Salmon Treaty (1985).
- An important part of this agreement is the use of the Panel's R&E Fund to achieve its salmon stock and habitat restoration objectives.
- We will be pleased to provide:
  - Criteria for R&E projects and the Panel's R&E budget priorities.
  - An outline for conceptual proposals.
  - An example of a conceptual proposal.

  And, any other information that we can muster that may be helpful to you.

Applicants are strongly urged to review their conceptual proposal with an agency technical contact before submitting their proposal to the Panel.

Project applicants will be kept informed on the status of the Panel's decisions and administrative processes as follows.

CALL AND REVIEW SCHEDULE FOR 2006 R&E PROJECT PROPOSALS

2005/06

Step 1–May–August Informal encouragement to previous applicants to prepare for this call.

Step 2–September 6 Advertise the call for conceptual proposals (CPs) in the Anchorage, Fairbanks, and Whitehorse newspapers.

Step 3–October 11 Deadline for 2006 CPs to be filed with the Panel's Executive Secretary–preferably by email.

Step 4 - December 10 Panel decisions will be made on the 2006 conceptual proposals.

Step 5 - December 14 E-mail response to each CP applicant indicting either:

- "Approved" - the applicant is encouraged to submit a detailed project proposal based on the CP as submitted;

- "Modified" – the applicant is encouraged to submit a detailed project proposal to incorporate the revisions requested by the Panel;
- "Other" – as determined by Panel comment; or,
- "Not Approved" – being of relatively low priority, or not meeting the criteria of the Panel's R&E program.

Step 5 – January 19 Deadline for receipt of detailed project proposals.

Step 6 – March 17 Panel will make its decisions on the detailed project proposals which will be communicated to all applicants.

ASSISTANCE TO PROJECT PROPONENTS

Those wishing to participate in the Panel's R&E program are encouraged to contact agency technical staff and the Panel's Executive Secretary–we will work with you to help produce your best application for the Panel's consideration.

For administrative information and to submit applications:

Hugh J. Monaghan
Executive Secretary
Yukon River Panel
Box 20973
Whitehorse, Yukon
Y1A 6P4

Phone: (867) 393-1900
Fax: (867) 633-8677
E-mail: monaghan@internorth.com

FOR TECHNICAL ADVICE:

In Yukon,

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In Alaska,

Susan McNeil
Alaska Department of Fish & Game, Anchorage
Phone: (907) 267-2166
Fax: (907) 267-2442
E-mail susan_mcneil@fishgame.state.ak.us

Note: the Panel's call for R&E proposals for 2007 is expected to follow this format and schedule (given a week or two with the dates – to be published on the Panel's website) and annually stated priorities, also on the 'site'.

7.0 YUKON RIVER SALMON RUN OUTLOOKS 2006

7.1 ALASKA

7.1.1 Chinook Salmon

Yukon River Chinook salmon return primarily as age-5 and age-6 fish, although age-4 and age-7 fish also contribute to the run. The 4-year-old component in 2005 was below average and the 5-year-old component was above average. The previous two years (2004 and 2005) runs have been near average indicating good production from the poor runs of 1999 and 2000. Spawning ground escapements in 2000, the brood year producing 6-year-old fish returning in 2006 were well below escapement goals throughout the drainage; however, the 2000 low return year produced a strong age-5 class that exceeded most escapement objectives in 2005.

Assuming an approximately normal return of 5-year-old and 6-year-old fish, the 2006 run is expected to be average to below average and similar to the 2005 run. Given the uncertainties associated with 2000 and 2001 declines in escapement, it is anticipated the run will provide for escapements, support a normal subsistence harvest, and a below average commercial harvest. Fishery management will be based upon inseason assessments of the run. If inseason indicators of run strength suggest sufficient abundance exists to have a commercial fishery, the commercial harvest in Alaska could range from 30,000 to 60,000 Chinook salmon. This range of commercial catch is below the 10-year (1996-2005, not including the low return years of 2000-2001) average of approximately 66,053 Chinook salmon.

7.1.2 Summer Chum Salmon

Strength of the summer chum salmon runs in 2006 will be dependent on the production of the escapements from 2002 (age-4 fish) and 2001 (age-5-fish). The 2001 run of summer chum salmon was one of the poorest on record and none of the escapement goals were met. Summer chum salmon runs have exhibited steady improvements since 2001 with harvestable surpluses in each of the last four years (2002-2005). However, it appears production was poorer for spawning tributaries in the lower portion of the drainage such as the Andreafsky and Anvik Rivers the last four years, whereas production was much higher for spawning tributaries upstream of Anvik River. Weak returns in chum salmon runs from 1998 through 2001 are attributed to reduced productivity, and not the result of low levels of parent year escapements. In 2005, a large number of 4-year-old summer chum salmon returns were observed throughout the AYK Region. The BASIS (Bering-Aleutian Salmon International Survey) study has observed significant increases in juvenile chum in the Bering Sea. Further, Bering Sea trawl bycatch has observed increases in adult chum. Although all of these fish are not bound for Western Alaska, higher bycatch is an indicator of favorable ocean conditions and chum ocean survival may have increased significantly.

If ocean conditions are more conducive to survival, the run is anticipated to be average and provide for escapements, support a normal subsistence and commercial harvest. If inseason indicators of run strength suggest sufficient abundance exists to have a commercial fishery, the commercial harvest in Alaska could range from 500,000 to 900,000 summer chum salmon depending on salmon market conditions.

7.1.3 Fall Chum Salmon

Yukon River drainagewide estimated escapements of fall chum salmon for the period 1974 through 2001 have ranged from approximately 180,000 (1982) to 1,500,000 (1975), based upon expansion of escapement assessments for selected stocks to approximate overall abundance (Eggers 2001). Escapements in these years resulted in subsequent returns that ranged in size from approximately 312,000 (1996 production) to 1,400,000 (1975 production) fish, using the same approach to approximating overall escapement. Corresponding return per spawner rates range from 0.3 to 3.2, averaging 1.8 for all years combined (1974-1999).

A considerable amount of uncertainty has been associated with these run projections because unexpected run failures (1997 to 2002) were followed by a strong improvement in productivity from 2003 through 2005. Weakness in salmon runs before 2003 has generally been attributed to reduced productivity in the marine environment and not a result of low levels of parental escapement. Likewise, the recent improvements in productivity may be attributed to the marine environment. Projections have been presented as ranges since 1999 to allow for adjustments based on more recent trends in production. Historical ranges included the normal point projection as the upper end and the lower end was determined by reducing the projection by the average ratio of observed to predicted returns from 1998 to each consecutive current year through 2004. In 2005 the average ratio of the years 2001 to 2004 was used, in attempts to capture some of the observed improvement in the run.

Yukon River fall chum salmon return primarily as age-4 and age-5 fish, although age-3 and age-6 fish also contribute to the run (Table 15). The 2006 run will be comprised of parent years 2000 to 2003. Estimates of return per spawner based on brood year return were used to estimate production for 2000 and 2001 and an auto-regressive Ricker spawner-recruit model was used to predict returns from 2002 and 2003. The point estimate utilizes 1974 to 1983 odd/even maturity schedules to represent years of higher production. The 2006 projected point estimate is 1.2 million fall chum salmon with the following approximate age composition:

Brood Year	Escapement	Estimated production (R/S)	Estimated Production	Contribution based on age	Current Return
2000	212,376	1.87	397,143	0.1%	933
2001	337,904	8.04	2,716,748	37.7%	455,847
2002	384,932	2.52	970,029	56.5%	684,126
2003	684,310	1.92	1,313,875	5.8%	69,771
Total expected run (unadjusted)					1,210,676
Total expressed as a range based on the forecasted vs. observed returns from 1987 to 2005 (80% CI):					1.0 to 1.4 million

The forecast range is based on the upper and lower values of the 80% confidence bounds for the point projection. Confidence bounds were calculated using deviation of point estimates and observed returns from 1987 through 2005. Therefore the 2006 run size projection is expressed as a range from 1.0 to 1.4 million fall chum salmon.

Escapements for the 2000 parent year that will contribute age-6 fish in the 2006 run were extremely poor and below the minimum drainagewide escapement goal of 300,000 fall chum salmon. Both 2001 and 2002 escapements were within the drainagewide escapement goal range but in the lower third. The major contributor to the 2006 fall chum salmon run is anticipated to be age-4 fish returning from the 2002 parent year. This is the second year of returns from the 2002 brood year however stocks within the Tanana River drainage may have been affected by a magnitude 7.9 earthquake which occurred November 3, 2002. The epicenter was located within the Alaska Range on the Denali fault line and could have affected fall chum and coho salmon eggs incubating in gravels from the Toklat River in the Kantishna River drainage to the upper Tanana River mainstem including the Delta River area.

Age-3 fish are typically a small portion of the return, however of concern was the total lack of them in the 2005 return (Table15). In 2004, an exceptional return of approximately 130,000 age-3 fish, followed by a return of approximately 1.9 million age-4 fish in 2005 from the 2001 brood year may indicate a significant contribution of age-5 fish returning in 2006. Age-3 fish return in 2004 represented the second highest return on record and age-4 return in 2005 represented the highest return on record, both from the 2001 brood year. Return of age-4 fish from even-numbered brood years during the time period 1974 to 1999 typically averages 390,000 chum salmon, and ranges from a low of 175,000 for brood year 1988 to a high of 653,000 for brood year 1992. Based on the high production years from 1974 to 1983, the return of even-numbered brood years averages only 619,000 chum salmon. Return of age-5 fish from even-numbered brood years during the time period 1974 to 1999 typically averages 179,000 chum salmon, and ranges from a low of 57,000 for brood year 1998 to a high of 418,000 for brood year 1990. Reduction in age-5 fish could be a function of competition with pink salmon or an indication during years of extremely high production fish come back earlier as indicated by extremely high percentages of age-3 and age-4 fish observed in the last three years. If the 2006 run materializes within the projected range it will be only the second time an even-numbered year will exceed 1.0 million fish, the only other being 1996.

The projection for 2006 is based on evident improvements in production observed in 2003, 2004 and the exceptional return in 2005. If the return is anywhere near the projected range, it will be well above the upper end of the BEG of 600,000 fall chum salmon. The 2006 projected range of run size should support normal subsistence fishing activities and should provide opportunity for commercial ventures where markets exist. The run will be monitored in season to determine strength in relation to estimated range and what amount of harvest can be provided based on the levels stipulated in the Alaska *Yukon River Drainage Fall Chum Salmon Management Plan*.

7.1.4 Coho Salmon

Although comprehensive escapement information on Yukon River drainage coho salmon is lacking, it is known coho salmon primarily return as age-4 fish and overlap in run timing with fall chum salmon. The major contributor to the 2006 coho salmon run will be the age-4 fish returning from the 2002 parent year. Based on Pilot Station sonar operations from 1995, and 1997 through 2005, the 2002 return was below average and near average in run timing. The Delta Clearwater River (DCR) was well above average in abundance in 2002 however evaluations of escapement in the Andreafsky (second lowest weir count), Nenana, and Richardson Clearwater River were average to below average. DCR is the major producer of coho salmon in the upper Tanana River drainage, and the parent year escapement of 38,625 fish was more than double the upper end of the SEG range of 5,200 to 17,000 coho salmon. Based on

coho salmon escapements in the DCR abundance has been on the increase since 1972, in particular within the last decade. Assuming average survival, the 2006 coho salmon run, is anticipated to be average to above average based on good escapements in 2002.

The Alaska *Yukon River Coho Salmon Management Plan* allows a directed commercial coho salmon fishery, but only under unique conditions. Directed coho salmon fishing is dependent on the assessed levels of return of both coho and fall chum salmon since they migrate together.

7.2 CANADA

7.2.1 Canadian-Origin Upper Yukon Chinook Salmon

Total run size of the Canadian-origin Upper Yukon River Chinook salmon return in 2006 is expected to be below average to average with a preseason outlook of 93,000 fish. This outlook is based on a stock/recruitment (S/R) model developed from the 1982 to 1999 brood years. Annual returns were reconstructed using US and Canadian catch data, ADF&G scale pattern and DNA analyses, and Fisheries and Oceans Canada tagging results. The escapement for 1984 was estimated by expanding a cumulative five-area escapement index (Tatchun Cr., Big Salmon R., Nisutlin R., Wolf R., and the non-hatchery returns to the Whitehorse Fishway) by the average proportion the index represented of the total escapement estimates. Mark-recapture results were used to estimate the Canadian border escapement in 1982, 1983 and from 1985 onwards.

Two of the four primary brood years contributing to the 2006 return exceeded the interim rebuilding goal of 28,000 Chinook salmon. These returns involved an estimated escapement of 42,438 Chinook salmon in 2001 and 40,145 in 2002. Both of these returns were within, and close to the upper end of the interim escapement goal range of 33,000 to 43,000 for rebuilt stocks. The other two primary brood years contributing to the 2006 return had estimated escapements well below the lower end of the rebuilding goal. The estimated escapement in 1999 was 11,362, and the estimate in 2000 was 11,344. The weighted (by age) brood escapement for the 2006 Upper Yukon Chinook salmon run is 20,800 fish.

The 2006 run outlook was estimated by first using the S/R model to calculate the total expected returns from each brood year escapement and then, apportioning these returns by the ten-year average age composition of brood year returns. The estimated production from each brood year was summed to produce the estimated run size of 93,000 for 2006. The S/R relationship projects very high return per spawner values for the low escapement years and much lower returns per spawner for the high escapement years. The estimated return/spawner for each of the principal brood years is as follows: 9.0for 1999; 9.0 for 2000; 1.7 for 2001; and 1.9 for 2002. Over the 1996-2005 period, the average age composition of brood year returns is as follows: <0.02% age-3, 3.2% age-4, 28.6% age-5, 59.4% age-6, 8.7% age-7, and 0.01% age-8.

In recent years, expected run sizes were frequently lower than the observed run sizes and a numerical outlook range was used to demonstrate uncertainty. The S/R relationships developed should be viewed as an index and they do not capture the uncertainty associated with rapid changes in marine and/or freshwater survival. An additional consideration is spawner-recruitment relationships are usually developed from density-dependent relationships developed for a single stock rather than the aggregate of a number of stocks as is used for Yukon River Chinook outlooks.

Performance of run outlooks based on unadjusted S/R models for the 1998 to 2005 period have been updated are shown in the following table.

Year	Expected Run Size (Preseason)	Observed Run Size (Post season)	PROPORTION OF EXPECTED RUN
1998	143,000	69,500	0.49
1999	84,700	83,800	0.99
2000	128,000	36,100	0.28
2001	124,000	77,500	0.63
2002	95,000	110,700	1.17
2003	90,300	117,600	1.30
2004	107,200	109,100	1.02
2005	107,000	90,200	0.84
Average (1998 to 2005)			0.84

A review of the past performance of preseason outlooks is an attempt to take into account a recent decline in the Upper Yukon Chinook salmon return per spawner values. Despite good brood year escapements, the observed run sizes within the 1998 to 2001 period were relatively low. Available information suggests low returns observed resulted from poor marine survival.

Interim escapement goal range for rebuilt Upper Yukon Chinook salmon, excluding Porcupine River drainage stocks, is 33,000 to 43,000 fish[14]. In recognition that Chinook salmon escapements were depressed, the Yukon River Panel developed an interim rebuilding goal of >28,000[15] for the 1996 through 2002 period toward which both Parties (US and Canada) have been endeavoring to manage.

7.2.2 Canadian-Origin Upper Yukon Chum Salmon

Outlook for the 2006 Upper Yukon chum salmon run is an average return. On average, 60% of upper Yukon adult chum salmon return as age-4 and 37% return as age-5. These percentages suggest the major portion of the 2006 chum salmon run will originate from the 2001 and 2002 brood years. The estimated escapements for these years were 33,851 and 98,695, respectively. Therefore, one of the two primary brood years, which will contribute to the 2006 run exceeded 80,000 fish, the escapement goal for rebuilt Upper Yukon River chum salmon. The weighted (by age) brood escapement for the 2006 Upper Yukon chum salmon run is 74,400.

[14] The development of a more comprehensive Biological Escapement Goal based criteria developed by the Chinook Technical Committee of the Pacific Salmon Commission requires additional information.

[15] The 2001 outlook was for a poor run. There was a desire to provide harvest opportunities for the subsistence fishery in Alaska and the aboriginal fishery in Canada. The Yukon River Panel expected limited fishing opportunities would provide a maintenance harvest and a Canadian spawning population exceeding 18,000 Chinook salmon.

In 2003, the escapement target for Canadian-origin Upper Yukon Chinook salmon was 25,000. This target was increased to 28,000 in the event a U.S. commercial fishery was initiated.

In 2004, the escapement target for Canadian-origin Upper Yukon Chinook salmon was 28,000 Chinook salmon. This goal was consistent with the Yukon River Panel recommendation from the March 2004 Yukon Panel meeting. If the run was gauged to be sufficiently strong, the escapement target could range up to 38,000 Chinook salmon, although the Panel did not describe what constitutes a "strong" run

In 2005, the escapement target for Canadian-origin Upper Yukon Chinook salmon was 28,000 Chinook salmon.

Before 2002, preseason outlooks for upper Yukon chum salmon were based on an assumed productivity of 2.5 returning adults per spawner (R/S); this was the same productivity used in the joint Canada/US Upper Yukon chum salmon rebuilding model. This return rate was similar to the estimated 1982-1995 average drainagewide chum salmon R/S rate of 2.6. The average R/S for the 1990 to 1995 brood years was also 2.6. There was, however, very low survival from the 1994 to 1998 brood years; the R/S values calculated for these brood years were below average and the rate for 4 of 5 years within this period were below or equal to the replacement value. For example, the estimated R/S rates for brood years 1994 to 1998 were 0.8, 0.7, 0.3, 1.0 and 1.6, respectively. Long term average R/S for brood years 1982 to 2000 is 2.34 and the recent average for brood years 1986 to 2000 is 1.73.

Since 2002, preseason outlooks have been based on stock/recruitment models which incorporate escapement and subsequent associated adult return by age data. Annual runs were reconstructed using mark-recapture data and assumed contributions to US catches. Although insufficient stock identification data were available for accurately estimating the annual US catch of Upper Yukon chum salmon, rough estimates were made using the following assumptions:

1) Thirty percent of the total US catch of chum salmon was composed of Canadian-origin fish;
2) US catch of Canadian-origin Upper Yukon and Canadian-origin Porcupine River chum salmon were proportional to the ratio of their respective border escapements; and
3) Porcupine River border escapement consisted of the Old Crow aboriginal fishery catch plus the Fishing Branch River weir count.

All of these assumptions require additional evaluation because some recent Porcupine River mark-recapture data has become available and advances in genetic stock identification should permit more accurate catch estimates.

S/R models were used to predict return per spawner for individual brood years. Total production from each brood year was estimated by applying the calculated R/S to the escapements in 2001 and 2002. Expected production in 2006 was estimated by assuming each brood year would produce an average age composition, i.e. 1.2% age-3, 60.2% age-4, 37.4% age-5, and 1.6% age-6. For example, the estimated R/S for the brood escapement of 98,695 in 2002 is 1.25. The total production from the 2002 escapement is therefore expected to be123,800 fish. If 60.2% of this production returns at age-4, it is expected 74,500 fish from the 2002 escapement will contribute to the 2006 run. Summing the estimated production from the 2000 to 2003 brood year escapements produces a total expected run size of 126,000 in 2006.

A summary of preseason outlooks, postseason run size estimates and proportion of expected run size observed for the 1998 to 2005 period is summarized in the following table.

Year	Expected Run Size (Preseason)	Estimated Run Size (Postseason)	PROPORTION OF EXPECTED RUN
1998	198,000	61,400	0.31
1999	336,000	98,400	0.29
2000	334,000	62,900	0.19
2001	245,000	45,100	0.18
2002	144,000	109,900	0.76
2003	145,000	170,800	1.18
2004	146,500	181,300	1.24
2005	126,000	504,500	4.00
Average (1998 to 2005)			1.02

The 1998 to 2002 Canadian-origin Upper Yukon chum runs consistently failed to meet preseason outlooks and it appears the assumed adult production of 2.5 R/S was far too high in most of these years. However, exceptional marine survival appears to have bolstered the run in 2005. This corresponded with far above average encounter rates of chum salmon in the US domestic trawl fishery in 2004. It should be noted encounter rates in 2005 were even higher suggesting marine survival may also be high for the 2006 run.

7.2.3 Canadian-Origin Porcupine River Chum Salmon

Fishing Branch River has been a recent conservation concern for chum salmon. The 2000 return was only 5,053 fish. However, some improvement was observed in 2003 when 29,519 chum salmon were counted, in 2004 when 20,274 were counted, and remarkable improvement in 2005 when 121,413 were counted.

The 2006 chum salmon run to Canadian portions of the Porcupine River drainage should originate primarily from the 2001 and 2002 escapements. The Fishing Branch River weir counts for these years were 21,669 and 13,563 chum salmon, respectively. These counts were 47.5% and 67.2%, respectively, below the 2001-2005 average of 41,288 fish. The 2001 and 2002 counts both fall below the lower end of the Fishing Branch River interim escapement goal range of 50,000 to 120,000 chum salmon. The weighted (by age) brood year escapement for the 2006 Fishing Branch River chum run is 17,105 fish.

Assuming a return/spawner value of 2.5, and using the average ten-year (even year) age at maturity for Fishing Branch River chum salmon of 54.9% age-4 and 42.6% age-5 fish, as indicated in the table below, a return of 42,800 chum salmon is expected in 2006.

		Estimated Production		
Brood Year	Escapement	@ 2.5 (R/S)	Contribution based on age	2006 Return
2001	21,669	54,173	42.6%	23,077
2002	13,563	33,908	54.9%	18,615
Sub-total				41,692
Total expected run (expanded for other age classes and rounded)				42,800

However, a return/spawner value of 2.5 may be conservative given improved production in recent years and remarkable run size observed in 2005. For example, assuming the 2005 Fishing Branch River count (121,413) represented 80% of the total Fishing Branch River run size, the

R/S for the weighted brood year escapement (15,285) was 9.9 adults per spawner. The 2005 return was composed of approximately 91% 4-year old fish; therefore, most fish were produced from the 2001 escapement of 21,669.

The outlook for the 2006 Fishing Branch River chum salmon return is for a below average return. However, the 2006 outlook is similar to the 2005 outlook and it is anticipated survival which contributed to the exceptional 2005 return will continue to some extent. The 2006 outlook is therefore viewed as a conservative outlook.

As was observed with the Upper Yukon chum salmon stocks, Porcupine chum salmon run sizes were consistently below the preseason outlook throughout the 1998 to 2002 period demonstrated in the following table.

Year	Expected Run Size (Preseason)	Estimated Run Size (Post season)	PROPORTION OF EXPECTED RUN
1998	112,000	24,700	0.22
1999	124,000	23,600	0.19
2000	150,000	12,600	0.08
2001	101,000	32,800	0.32
2002	41,000	19,300	0.47
2003	29,000	46,100	1.59
2004	22,000	31,700	1.44
2005	48,000	189,700	3.95
Average–1998 to 2005			1.03

7.2.4 Spawning Escapement Target Options: Canadian Origin Chinook and Chum Salmon 2006

The JTC examined a number of options for spawning escapement targets for Canadian origin Chinook salmon and chum salmon stocks for 2006. Options developed:

- Determine the weighted average (weighted by age composition) of the principle brood year escapements contributing to the 2006 Chinook salmon (1999 to 2002) and chum salmon (2001 and 2002) salmon runs, referred to as the base level escapement;
- Calculate the appropriate targets that would step the base level escapement to the respective rebuilding goals for Chinook and chum salmon (as specified in the Agreement) over one, two, or three cycles (also specified in the Agreement).

7.2.4.1 Upper Yukon Chinook Salmon

The base level Chinook salmon escapement (weighted average of 1999 to 2002 escapements) for 2006 is 21,200 fish. The targets to rebuild this base level escapement to the Chinook salmon escapement goal range of 33,000 to 43,000 over one, two, and three cycles are as follows:

Basel Level Escapement = 21,200	
Rebuilding Option	2006 Escapement Target
1 cycle	38,000
2 cycle	30,000
3 cycle	27,000

To assess the potential impact of various rebuilding options presented above, the JTC examined what the consequences of each option might be to the fisheries given the 2006 run outlook for a total run size of 93,000 Canadian-origin Chinook salmon. The following table summarizes the expected total allowable catch (TAC), harvest shares, border escapement targets and maximum allowable US harvest rates at different run sizes.

Run Size	Esc. Target	TAC	CDN Share (23%)	US Share (CDN stock)	Est. Total US Harvest	Border Passage Target	Allowable US Harvest Rate
93,000	38,000	55,000	13,000	42,000	84,000	51,000	45.2%
93,000	30,000	63,000	14,000	49,000	98,000	44,000	52.7%
93,000	27,000	66,000	15,000	50,000	100,000	43,000	53.8%

After reviewing the 2005 escapement target of 28,000 and the similar return expected for 2006, the JTC noticed insufficient differences in the 2006 outlook to justify changing the escapement target and therefore recommends it remain at 28,000 fish for 2006.

7.2.4.2 Upper Yukon Chum Salmon

The base level for the Upper Yukon Canadian-origin chum salmon escapement (weighted average of 2000 and 2001 escapements) for 2006 is 77,400 fish. The targets to rebuild this base level escapement to the chum salmon escapement goal range of >80,000 over one, two, and three cycles are as follows:

Basel Level Escapement = 77,400	
Rebuilding Option	2006 Escapement Target
1 cycle	>80,000
2 cycle	77,000
3 cycle	76,000

The 2006 outlook for the Canadian-origin chum salmon is 126,000 chum salmon. The expected total allowable catch (TAC), harvest shares, border escapement targets and maximum allowable US harvest rates at different run sizes were evaluated. The results are summarized in the following table:

Run Size	Esc. Target	TAC	CDN Share (32%)	US Share(CDN stock)	Est. Total US Harvest	Border Passage Target	Allowable US Harvest Rate
126,000	>80,000	46,000	15,000	31,000	125,000	95,000	24.6%
126,000	77,000	49,000	17,000	33,000	133,000	93,000	26.2%
126,000	76,000	50,000	16,000	34,000	136,000	92,000	27.0%

Total US harvest estimates in the above table are based on an assumed contribution rate of 25%. Market conditions are expected to be poor again in 2006 and hence commercial exploitation will likely be relatively light.

A higher than expected escapement is possible in 2006 given the remarkable chum salmon return observed in 2005, current harvest levels and the expected market conditions. Catches in the US portion will likely meet subsistence needs and provide some opportunity for commercial harvest and catches in the Canadian section of the upper Yukon would likely meet First Nation and some commercial needs.

After reviewing the 2006 run outlook, recent year's outlooks including the remarkable 2005 chum salmon return, sufficient optimism in the 2006 outlook justifies changing the escapement target from the 2005 target of 65,000 to >80,000 fish in 2006.

7.2.4.3 Fishing Branch River Chum Salmon

The 2006 run of Fishing Branch River chum salmon is expected to be 42,800, which is below the escapement goal of 50,000 to 120,000 fish. However the exceptional survival that contributed to the 2005 return is expected to increase the return per spawner rate. Base level escapement for the 2006 run is 17,100. Targets to rebuild this base level escapement to the Fishing Branch escapement goal over one, two, and three cycles are summarized below.

Basel Level Escapement = 17,100	
Rebuilding Option	2006 Escapement Target
1 cycle	50,000
2 cycle	33,500
3 cycle	28,100

To assess the potential impact of different rebuilding options, a similar approach to that done for Upper Yukon Chinook and chum salmon was followed. The results are summarized below.

Run Size	Esc. Target	TAC
42,800	50,000	0
42,800	33,500	9,300
42,800	28,100	14,700

Under a one-cycle rebuilding program, the target escapement of 50,000 fish is 17% higher than the predicted total run of 42,800. Even with a drainagewide fishing closure, this target is not achievable. Under a two-cycle rebuilding program, the target escapement of 42,800 would leave 9,300 fish available for harvest drainage wide. To achieve such a target, severe restrictions would be required in fisheries throughout the drainage

Under the three-cycle rebuilding program, target escapement of 28,100 would allow a drainagewide harvest of 14,700 fish. This level TAC would allow a near normal level of Vuntut Gwitchin Government harvest of up to 6,000 fish near Old Crow, and a total available harvest for U.S. of 8,700 fish. This harvest would require a maximum harvest rate of 20% in US fisheries drainage wide and may require additional subsistence restrictions and eliminate the possibility of commercial fishing. Given the severity of the restrictions necessary, achieving this level of escapement may not be possible.

The three cycle rebuilding scenario with an escapement target of 28,100 could be reviewed as a stabilization escapement target option implemented if inseason information suggests the 2006 return is similar to the outlook. This option would allow a drainagewide harvest of 14,700 fish. Such a drainagewide harvest level would allow some US and Canadian fisheries including the First Nation harvest at Old Crow, which is normally about 6,000 fish, and US subsistence and commercial harvests at a 20% harvest rate.

8.0 STATUS OF BIOLOGICAL ESCAPEMENT GOALS

ADF&G undertakes a triennial review of salmon escapement goals in preparation for its triennial Board of Fisheries (board) meeting. This review is governed by the state's Policy for the Management of Sustainable Salmon Fisheries (5AAC 39.222) and Policy for Statewide Salmon Escapement Goals (5AAC 39.223) adopted in 2001. Under these policies the department sets either a biological escapement goal (BEG) or a sustainable escapement goal (SEG) (ADF&G 2004, 2006). Biological escapement goal (BEG) means a level of escapement that provides the highest potential to produce maximum sustainable yield. Sustainable escapement goal (SEG) means a level of escapement known to provide for sustainable yield over a five to ten year period.

Most AYK Region escapement goals were set in the late 1970s or early 1980s. These goals were first documented by Buklis (1993) as required under the department's original escapement goal policy signed in 1992. The next changes to these goals were adopted in 2001 when BEGs were set for Yukon fall chum salmon (Eggers 2001), Anvik River summer chum salmon (Clark and Sandone 2001), and Andreafsky River summer chum salmon (Clark 2001). These 2001 goals were adopted prior to passage of the policies, but were consistent with the policies.

Beginning in December of 2002, ADF&G undertook the first full review of its escapement goals following the adoption of the policies. An escapement goal review team consisting of staff from Sport Fish and Commercial Fisheries Divisions met five times over a fourteen-month period. Federal agency biologists and representatives of Tribal and fishing groups were invited to attend and participate in the meetings. The team's recommendations were presented to the Alaska Board of Fisheries in January 2004 and formally adopted by the department in 2005. During this review, analyses for escapement goals established in 2001 were updated with the latest information and most goals were brought into compliance with the policies by making them ranges, rather than point goals.

In preparation for the January 2007 Board of Fisheries meeting, the department is again reviewing escapement goals. This review began in April of 2005. Draft analyses were distributed to agencies and public for review and comment starting in January 2006 and a public review draft of recommendations for changes was distributed in March 2006. No changes are anticipated to Yukon River escapement goals for 2007.

8.1 CHINOOK SALMON

Five Chinook salmon aerial survey goals were converted to ranges and formally adopted in 2005 using the method devised by Bue and Hasbrouck (2001). In the case of Nulato River, the goals for the two forks were combined into a single goal.

Chinook Salmon Stock	Previous Goal (Type) Year Established	Goal Adopted in 2005 (Type)
E. Fork Andreafsky River	>1,500 (EO[1]) 1992	960-1,700 (SEG)
W. Fork Andreafsky River	>1,400 (EO[1]) 1992	640-1,600 (SEG)
Anvik River	>1,300 (EO[1]) 1992	1,100 – 1,700 (SEG)
Gisasa River	>600 (EO[1]) 1992	420 – 1,100 (SEG)
Nulato N. and S. combined	None	940 – 1,900 (SEG)
Chena River	2,800 – 5,700 (BEG) 2001	No Change
Salcha River	3,300 – 6,500 (BEG) 2001	No Change

[1] Goals were called escapement objectives (EO) because they were inconsistent with definitions BEG and SEG within the policy

8.1.1 JTC Discussion of BEG for Upper Yukon Chinook Salmon

A comprehensive Biological Escapement Goal for Canadian origin Upper Yukon River Chinook salmon cannot be developed using available data and the Chinook Technical Committee criteria. At this time, the data are insufficient to warrant a PSARC review. The JTC will continue to reconcile minor differences in harvest and escapement estimates and investigate other methods to develop a less comprehensive BEG or a Spawning Escapement Goal. Available information on the return per spawner information for Yukon River Chinook salmon is presented in Table 15 and Figure 4.

8.2 SUMMER CHUM SALMON

Aerial survey goals for summer chum salmon were discontinued for the East and West Forks of the Andreafsky River in favor of using the East Fork Andreafsky River weir escapement goal as an index of escapement into the system. No change was recommended for the East Fork Andreafsky River weir goal. The biological escapement goal for Anvik River summer chum salmon was revised from the 400,000 to 800,000 fish range to a range of 350,000 to 700,000 as measured by the Anvik River sonar.

Summer Chum Salmon Stock	Previous Goal and Year Established	Goal Adopted in 2005 (Type)
E. Fork Andreafsky River	65,000– 130,000 (BEG) 2001	No Change (weir)
E. Fork Andreafsky River	35,000– 70,000 (BEG) 2001	Discontinued (aerial)[1]
W. Fork Andreafsky River	65,000– 130,000 (BEG) 2001	Discontinued (aerial)[1]
W. Fork Andreafsky River	35,000– 70,000 (BEG) 2001	Discontinued (aerial)[1]
Anvik River	400,000– 800,000 (BEG) 2001	350,000 – 700,000 (sonar)

[1] Discontinued because of difficulty conducting aerial surveys of summer chum salmon.

8.3 FALL CHUM SALMON

Analyses for all biological escapement goals for Alaskan fall chum salmon stocks were updated using the most recent data and no change was recommended for any of the goals.

Fall Chum Salmon Stock	Previous Goal (Type) Year Established	Goal Adopted in 2005
Yukon Drainage	300,000 – 600,000 (BEG) 2001	No Change
Tanana River	61,000 – 136,000 (BEG) 2001	No Change
Delta River	6,000 – 13,000 (BEG) 2001	No Change
Toklat River	15,000 – 33,000 (BEG) 2001	No Change
Upper Yukon tributaries	152,000 – 312,000 (BEG) 2001	No Change
Chandalar River	74,000 – 152,000 (BEG) 2001	No Change
Sheenjek River	50,000 – 104,000 (BEG) 2001	No Change

8.4 COHO SALMON

For coho salmon, the Delta Clearwater River boat survey goal was revised from >9,000 to range of 5,200 – 17,000 using the Bue and Hasbrouck (2001) method.

9.0 MARINE FISHERIES INFORMATION

9.1 INTRODUCTION

Yukon River salmon migrate as juveniles out of the river and into the Bering Sea. Where they go once they enter the ocean is only partly understood, but evidence from tagging studies and the analysis of scale patterns indicate these salmon spread throughout the Bering Sea, some move considerably south of the Aleutian Island chain into the Gulf of Alaska and North Pacific Ocean, and some move north into the Chukchi Sea. While in the ocean, they mix with salmon stocks from Asia and elsewhere in North America.

Some of these salmon are caught by commercial fisheries that take place in marine waters. Marine commercial fisheries with a bycatch that likely included some Yukon River salmon: (1) U.S. groundfish trawl fisheries in the Bering Sea-Aleutian Islands management area (BSAI) and in the Gulf of Alaska, and (2) purse seine and gill net salmon fishery in the South Alaska Peninsula ("False Pass") area. Other commercial fisheries which operate in marine waters of the Bering Sea and Gulf of Alaska where Yukon River salmon occur, but which catch few, if any, salmon include: (1) U.S. longline fisheries for Pacific halibut, Pacific cod, and other groundfish, (2) U.S. pot fisheries for Pacific cod and other groundfish, and Dungeness, king, and Tanner crab, and (3) U.S. purse seine and gillnet fisheries for Pacific herring.

Until 1992, five large commercial fisheries in the ocean caught large numbers of salmon, some of which were likely Yukon River salmon. However, under international agreements, these fisheries no longer operate (in order of decreasing salmon catches): (1) Japanese high-seas mothership and land-based salmon gill net fisheries; (2) high-seas squid gillnet fisheries in the North Pacific Ocean of Japan, the Republic of Korea, and the Republic of China (Taiwan); (3) foreign groundfish fisheries of the Bering Sea and Gulf of Alaska, (4) joint venture groundfish fisheries of the Bering Sea and Gulf of Alaska, and (5) groundfish trawl fishery by many nations in international waters area of the Bering Sea ("the Doughnut Hole").

South Alaska Peninsula June fishery is thought to harvest large numbers of western Alaska chum salmon. Catch figures for this fishery from 1980 to 2005 are shown in Table 16 and Figure 5. Substantial changes were made to this fishery in 2001 reduced catch. The 20 year average before 2001 was 1,566,000 sockeye salmon and 489,000 chum salmon. The four year average since 2001 has been 849,000 sockeye salmon and 393,000 chum salmon. A small commercial salmon gill net fishery operates in subdistricts at various river mouths in Norton Sound, and is managed by the ADF&G and the Alaska Board of Fisheries. A small portion of Chinook and chum salmon caught in the southern subdistricts may be bound for the Yukon River. In 2005, the commercial catch of Chinook and chum salmon for all of the Norton Sound subdistricts combined totaled <1,000 Chinook and 4000 chum salmon. The prior five-year (1997-2001) average commercial catch was 4,695 Chinook and 15,112 chum salmon.

Salmon runs were substantially better in 2003, 2004 and 2005 than in previous years across a broad region of western Alaska, including the Yukon River in Alaska and Canada. However, many stocks were still below average. The world catch of Chinook salmon has dropped significantly since the late 1970s (Figure 2), and the world chum catch is high, most of the harvest by Japan (Figure3). Causes for production failures are not known, but attention has focused on the marine environment because of the broad scope of production failures. Most likely factors to date include the effects of El Nino, ocean and climate regime shifts, and competition relative to ocean carrying capacity (i.e. hatchery/wild interactions). Nearly half the abundance of chum salmon in the North Pacific Ocean is now hatchery releases (Figure 4).

9.2 BERING SEA AND GULF OF ALASKA GROUNDFISH FISHERY

9.2.1 History and Management of the Groundfish Fishery

U.S. groundfish fisheries in the Bering Sea-Aleutian Islands (BSAI) and in the Gulf of Alaska (GOA) are managed under the Magnuson-Stevens Fisheries Conservation and Management Act by the North Pacific Fishery Management Council (NPFMC), and are regulated by the National Marine Fisheries Service (NMFS).

In general, groundfish fisheries of GOA are managed and regulated separately from those in BSAI. Both major areas contain a number of smaller regulatory areas, which are numbered. Groundfish fisheries east of 170° west longitude and north of the Alaska Peninsula are considered to be in BSAI (Figure 5 and 6). Groundfish fisheries operating in waters south of the Alaska Peninsula and east of 170° west longitude are considered to be in GOA.

U.S. groundfish fishery off the coast of Alaska expanded rapidly during the last 15 years. In 1977, the year after the Magnuson Act went into effect, U.S. groundfish harvest off Alaska amounted to only 2,300 metric tons (mt, 1 mt = 2,204.6 pounds), or only 0.2% of the total groundfish harvest off Alaska by all nations. Most of that U.S. catch was Pacific halibut caught with hook-and-line gear.

The Magnuson Act, which claimed exclusive fishery jurisdiction by the United States of waters to a distance 200 nautical miles seaward from the coast, allowed the U.S. to gradually replace foreign groundfish fisheries by "joint-venture" fisheries, in which U.S. fishers caught the fish and delivered them at sea to foreign fish processing vessels. Joint-venture fishery, in turn, was replaced by an entirely U.S. fishery. The estimated exvessel value of the total Alaskan commercial fisheries from 1982 through 2005 is given in Table 17, and Figure 7.

U.S. groundfish fisheries use basically three types of fishing gear: trawls, hook-and-line (including longline and jig), and pots. Of these types of fisheries, trawlers have by far the greatest impact on salmon bycatch numbers.

A major issue affecting BSAI and GOA groundfish fisheries was a NMFS biological opinion which concluded continued fishing for groundfish, including pollock, Atka mackerel and Pacific cod, under the agency's existing rules is likely to jeopardize the western population of Steller sea lions and adversely affect their critical habitat. Many of the North Pacific Councils actions in 2001 were related to Steller sea lion protection measures establishing temporal and spatial dispersion of harvest and protection of Steller sea lion critical habitat. There will now be two seasons for the pollock, Atka mackerel and Pacific cod fisheries and the amount taken within sea lion critical habitat will be limited. Among several documents prepared in accordance with the National Environmental Policy Act of 1969, NMFS published a Final Programmatic SEIS for the Alaska Groundfish Fisheries, a Final SEIS for Steller Sea Lion Protection Measures in the Alaska Groundfish Fisheries, and a Draft EIS for the essential fish habitat components of the several fishery management plans. The Western Alaska Community Development Quota (CDQ) Program, which has six groups representing the 65 western Alaska eligible communities expanded from pollock only to all federally managed BSAI groundfish species. Currently, the CDQ program is allocated portions of the groundfish fishery range from 10% for pollock to 7.5% for most other species. On January 1, 2000, the License Limitation Program (LLP) required any person who wished to deploy a harvesting vessel in the king and Tanner crab fisheries in BSAI and in the directed groundfish fisheries (except for IFQ sablefish, and for demersal shelf rockfish east of 140 degrees West longitude) in GOA or BSAI must hold a valid groundfish or crab license (as appropriate) issued under LLP.

9.2.2 Observer Program

Under U.S. law and regulations, salmon may not be retained by the U.S. groundfish fishery and must be returned to the sea. One exception is the voluntary Salmon Donation Program, which allows for distribution of Pacific salmon taken as bycatch in the groundfish trawl fisheries off Alaska to economically disadvantaged individuals by tax exempt organizations through a NMFS authorized distributor. This action supports industry initiatives to reduce waste from discard in the groundfish fisheries by processing salmon bycatch for human consumption. The groundfish observer program began in 1977 on foreign groundfish vessels operating within the U.S. Exclusive Economic Zone (200 nautical miles from the U.S. shore). It continued with the joint-venture fishery until its end. Until 1990, however, information on the accidental or incidental catch of salmon by the U.S. groundfish fishery was sparse.

In 1990, the United States began a scientific observer program for the U.S. groundfish fishery off the Alaska coast. In general, a groundfish harvesting or processing vessel must carry a NMFS certified observer on board whenever fishing or fish processing operations are conducted if the operator is required by NMFS Administrator, Alaska Region, NMFS, (Regional Administrator) to do so, and a shoreside groundfish processing plant must have a NMFS certified observer present whenever groundfish is received or processed if the plant is required to do so by the Regional Administrator.

The amount of observer coverage is usually related to length of the vessel or amount of fish processed by a shoreside plant or mothership processing-vessel. Groundfish harvesting vessels having a length of 125 feet or more are required to carry observers at all times when they are

participating in the fishery. Vessels with lengths between 60 through 124 feet are required to carry observers during 30 percent of their fishing days during trips when they fish more than three days. Vessels shorter than 60 feet do not have to carry observers unless required to do so by the Regional Administrator. Mothership or Shoreside processing plants processing 1,000 metric tons (mt) or more per month are required to have 100 percent observer coverage, those processing between 500 and 1,000 mt per month are required to have 30 percent coverage, and those processing less than 500 mt per month need no observer coverage unless it was required specifically by the Regional Administrator.

Observers must be trained and certified. To be certified as an observer by NMFS, an applicant must have a bachelor's degree in fisheries, wildlife biology, or a related field of biology or natural resource management. Observers must be capable of performing strenuous physical labor, and working independently without direct supervision under stressful conditions. Because observers are not employees of the Federal Government but instead hired by certified contractors, applicants must apply directly to a certified contractor. If hired, the contractor will arrange for them to attend a three-week observer training course in Seattle or Anchorage. Upon successful completion of the course, they will be certified as a groundfish observer.

In addition to observer coverage, all groundfish harvesters over 60 feet and processors must maintain and submit logbooks on their groundfish harvests and their catch of the prohibited species, including crabs, halibut, herring, and salmon.

9.2.3 Estimated Catch of Salmon in the Groundfish Fisheries

NMFS estimates the number of salmon caught in the groundfish fisheries from observer reports and weight of groundfish caught. Observers are instructed to collect random samples of each net haul before it is sorted, and to gather information from each salmon in a haul. Observers record the species caught and number of each species, determine sex of dead or dying salmon, record weight and length of each salmon, collect scales, and check for missing adipose fins. If a salmon is missing its adipose fin, the observer removes and preserves the snout, which may contain a coded-wire tag.

NMFS scientists use the number of salmon of each species caught in each haul sampled, weight of groundfish caught in each haul sampled, and total weight of groundfish harvested during sampling period to estimate the total number of salmon of each species caught by the entire groundfish fleet. Table 18 and Figure 8 present a summary of estimated numbers of Chinook and other salmon caught by the U.S. groundfish fisheries from 1990 through 2005. Table 18 indicates the number of salmon caught by the groundfish fisheries varies considerably by species of salmon, by year, and between BSAI and GOA. For the most part, Chinook and chum salmon make up most of the catch; coho is a distant third, and sockeye and pink salmon minor components.

Catch of salmon in BSAI in 2005 was 74,843 Chinook and 701,741 other salmon and in GOA the salmon catch was 31,895 Chinook and 6,841 other salmon. Certain areas in BSAI have been declared salmon savings areas for both chum and Chinook salmon (Figures 2 and 3) based on high catch rates in the past. After the 1998 season, because of the concerns regarding Chinook salmon conservation in western Alaska and in response to a proposal submitted by BSFA, NPFMC lowered allowable bycatch of Chinook salmon in the BSAI trawl fishery.

Because of record numbers of salmon taken in BSAI in 2003 and 2004 and information from the fishing fleet indicating catch was exacerbated by the savings areas, NPFMC is evaluating BSAI salmon management measures. In December 2004, NPFMC approved a draft problem statement and five alternatives for initial consideration to address the salmon catch problem. In January 2006, the NPFMC staff released a Public Review Draft entitled "Environmental Assessment/Regulatory impact Review/Initial Regulatory Flexibility Analysis for Modifying Existing Chinook and Chum Salmon Savings Areas." The Executive Summary is attached as Appendix I, and the full 326 page document can be viewed at the NPFMC web site: http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/bycatch.htm. Basically, three alternatives are being considered:

Alternative 1. Status Quo

Alternative 1 Maintains existing regulatory measures for Chinook and chum salmon savings area closures.

Alternative 2. Eliminate the regulatory salmon savings area closures

Under Alternative 2, the catch limits for the Bering Sea subarea trawl for Chinook salmon and BSAI trawl chum salmon would be eliminated, and would no longer trigger savings area closures. Annual closure of the Chum Salmon Savings Area would also be eliminated. Salmon would remain a prohibited species under this (and all) alternatives.

Alternative 3. Suspend the regulatory salmon savings area closures and allow pollock cooperatives and CDQ groups to utilize their voluntary rolling "hot spot" (VRHS) closure system to avoid salmon bycatch

Under Alternative 3, catch limits for Bering Sea subarea trawl, Chinook and BSAI trawl chum salmon would be suspended, and no longer trigger savings area closures. Annual closure of the Chum Salmon Savings Area would also be suspended. The suspension will go into effect so long as the pollock cooperatives and CDQ groups have in place an effective salmon bycatch VRHS closure system to avoid salmon bycatch.

In addition, a motion introduced in October, 2005 states, "The Council and NMFS have initiated action to exempt AFA qualified and CDQ vessels participating in the intercooperative VRHS from regulatory Bering Sea salmon bycatch savings areas." Full text of the motion is attached as Appendix II.

The ESA incidental take statement from the 1999 Salmon Biological Opinion is 55,000 Chinook salmon in BSAI and 40,000 Chinook salmon in GOA. On December 1, 2004, NMFS, Alaska Region reinitiated formal Section 7 consultation with NMFS, Northwest Region on the ESA listed Chinook salmon incidental takes in the BSAI groundfish fishery because groundfish fisheries exceeded the amount stated in the incidental take statement in 2004.

One of the big unanswered questions is, what stocks of salmon are being caught by the U.S. groundfish fisheries and how many of each stock. Some information comes from coded-wire tagged salmon recovered by observers, but that information only shows certain coded-wire

tagged stocks are caught, it says nothing specific about the many stocks without coded-wire tags. Canada has coded wire tagged upper Yukon River Chinook salmon for a number of years. To date, 16 have been recovered in the Bering Sea groundfish fisheries and three were picked up by the US BASIS cruise in 2003 (Table 19, Figure 9). In addition, ten Chinook salmon captured on the high seas and tagged have returned to the Yukon River Drainage (Figure 8).

9.3 LAW ENFORCEMENT

Operation North Pacific Watch, the US Coast Guard's (USCG) High Seas Driftnet (HSDN) Enforcement Plan, started in April with Canadian deployments to Shemya Island, Alaska. During 2005, USCG aircraft from Air Station Barbers Point Hawaii and Air Station Kodiak Alaska flew five deployments for a total of 138 surveillance hours in the Convention Area (214 hrs total including transit). USCG Cutter JARVIS participated in a multi-national fishing patrol from May 20 to July 30, which included all North Pacific Anadromous Fish Commission (NPAFC) parties plus China. JARVIS spent approximately 46 days in the Convention Area (Figure 10), made port calls in Japan and Korea, rendezvoused with Russian and Chinese patrol vessels, and embarked a shiprider from China and an observer from Korea.

	FY99	FY00	FY01	FY02	FY-03	FY-04	FY-05
Cutter operating days	50	10	0	0	60	0	46
Aircraft operating hours	236	151	117	125	195	109	138
HSDN vessels apprehended	3	1	0	0	6	0	0

Aircraft Patrols:

Deployment Dates	Air Station	Surveillance Hours
16 – 22 April	Kodiak	32
14 – 20 June	Kodiak	23
24 – 29 June	Barbers Point	33
10 – 16 July	Kodiak	23
26 – 31 July	Kodiak	27
Total		138

NOAA/NMFS Special Agents and Enforcement Officers deployed with Canadian CP-140 patrols (159 hours) to assist in identification of vessels and investigation into suspected illegal activity.

NOAA/NMFS Special Agent & Enforcement Officer effort (person-hours):

	1999	2000	2001	2002	2003	2004	2005
Patrol	190 hrs	210 hrs	459 hrs	271 hrs	257 hrs	125 hrs	159 hrs
Logistics	427 hrs	1204 hrs	180 hrs	0 hrs	0 hrs	0 hrs	0 hrs
Investigation	265 hrs	234 hrs	46 hrs	0 hrs	0 hrs	0 hrs	0 hrs
Total	882 hrs	1648 hrs	685 hrs	271 hrs	257 hrs	125 hrs	159 hrs

Note: Logistics and Investigation hours were "0" for 2002-2005, because no HSDN vessels were seized by US.

Thus far in 2005, five potential HSDN fishing vessels have been reported in the North Pacific. In May, a Canadian CP-140 aircraft deployed on HSDN patrol out of Shemya, Alaska in the Western Aleutian Islands sighted one HSDN-rigged vessel (ZHUU SHAN). United States albacore tuna fishers reported sighting the foreign fishing vessel "TUNG YANG 88" on May 20, 2005 actively fishing with approximately 12-14 nautical miles of large-scale driftnets near position 35Nº158E, and three days later, another unidentified drift net vessel near 35Nº159E. Seawater temperatures in the area were 16-20º Celsius, hence the vessels were believed to be targeting squid. The U.S. State Department is trying to determine nationality of the TUNG YANG 88 and will request flag-state enforcement. No USCG assets were available to respond at the time.

USCG patrols did not detect any vessels actively engaged in fishing contrary to the Convention and USCG cutters conducted no boardings. USCG aircraft did detect two vessels carrying gear on board capable of being used for large-scale driftnet fishing in the Convention Area. Positive identification was not determined. Vessels were also sighted in the Convention Area engaged in legitimate fisheries. Many radar contacts were not visually observed because of poor visibility. The following is a summary of HSDN-capable vessels detected by U.S. and Canadian aircraft and U.S. fishing vessels:

Date	Vessel Name	Flag	Position
16-May-05	Zhou Shan	Unknown	41-47N 166-56E
20-May-05	Tung Yang 88	Unknown	35-26N 158-06E
23-May-05	Unidentified Contact	Unknown	34-57N 159-01E
12-Jul-05	Unidentified Contact	Unknown	41-18N 160-07E
29-Jul-05	Unidentified Contact	Unknown	44-44N 160-03E

Japan patrolled the area west of the 180^{o} line and south of 51^{o} N with nine vessels for a total of 298 days, and 104 hrs of aircraft patrol. Russia patrolled with one aircraft and one vessel out of Vladivostok and Sakhalin, and five vessels and ten flights out of the North-East Coast Guard Directorate.

9.4 BERING SEA RESEARCH

9.4.1 Background

Extensive research begun in the Bering Sea in the last few years focuses on physical and biological oceanography and climate change. Many different organizations from several countries have been involved, and several international organizations have been formed to try to coordinate this research. The following discussion will concentrate on those studies directed toward Pacific salmon.

9.4.2 Bering-Aleutian Salmon International Survey

Bering-Aleutian Salmon International Survey (BASIS) is an NPAFC-coordinated program of ecosystem research on salmon in the Bering Sea. The major goal of this program, which was developed in 2001, is to clarify how changes in ocean conditions affect the survival, growth,

distribution, and migration of salmon in the Bering Sea. Research vessels from US (F/V Sea Storm, F/V Northwest Explorer), Japan (R/V Kaiyo maru, R/V Wakatake maru), and Russia (R/V TINRO), have participated in synoptic BASIS research surveys in Bering Sea since in 2002.

BASIS surveys have provided information on the distribution and abundance of fish occupying the pelagic ecosystem of the Bering Sea, with detailed information on salmon and juvenile life-history stages of Atka mackerel and walleye pollock. Salmon biomass in the western Bering Sea was the highest recorded in 2003 since Russian scientists began conducting salmon trawl surveys in the 1980s. Chum salmon constituted most of this biomass and were also the predominate species throughout the Bering Sea and adjacent North Pacific waters. Relative abundance of maturing pink salmon in 2003 was about eighty times higher than 2002 in the central Bering Sea. Juvenile sockeye were consistently the most abundant juvenile species on the eastern Bering Sea shelf, followed by chum, pink, coho, and Chinook salmon. New information on the distribution, migration and ecology of juvenile life-history stages of walleye pollock and Atka mackerel from BASIS surveys are providing insight into factors affecting the survival of these two keystone species of the Bering Sea and Aleutian Island ecosystems.

Stock mixtures of salmon from BASIS surveys in the Bering Sea have provided new information on oceanic migration and distribution of regional stock groups in the Bering Sea. Recent results from Japanese surveys indicate 81% of the immature chum salmon in the Bering Sea basin were from Asian (Russia and Japan) populations during August-September in 2002. Results from US surveys on the Bering Sea shelf and Aleutian chain indicate considerable spatial variation in stock mixtures; however, when pooled over location mixtures were very similar to mixtures present in the basin with 80% of the immature chum salmon from Asian populations. Immature chum salmon from western Alaska comprised 2% and 8% of immature chum salmon on the southern Bering Sea shelf and northern Bering Sea shelf, respectively. Stock mixtures of juvenile chum salmon have identified where migratory routes of western Alaska and Russian chum salmon stocks overlap and has helped identify the contribution of Russian stocks to the total biomass of juvenile chum salmon on the eastern Bering Sea shelf.

BASIS surveys on the eastern Bering Sea shelf have identified relatively large numbers of healthy juvenile salmon outmigrating from western Alaska river systems since 2002. Growth of juvenile sockeye salmon has been significantly higher since 2002 compared to 1999-2001. Average sizes of juvenile salmon are larger than other regions where early marine growth does not appear to be limited, such as southeast Alaska. Coho salmon in the Bering Sea had the highest energy density in 2003 compared to other populations in the Gulf of Alaska and Canadian coastal waters.

Figure 11 shows the cruise tracks for the 2005 U.S. and Russian BASIS surveys, and Figure 12 shows the 2005 Japanese BASIS surveys. The catch per unit of effort for the 2005 BASIS survey is shown in Figure 13.

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TABLES

Table 1.–Alaskan commercial salmon sales and estimated harvest by district 2005[a].

District/ Subdistrict	Number of Fishermen[b]	Chinook			Summer Chum			Fall Chum			Coho		
		Sold in Round	Pounds of Roe	Estimated Harvest[c]	Sold in Round	Pounds of Roe	Estimated Harvest[c]	Sold in Round	Pounds of Roe	Estimated Harvest[c]	Sold in Round	Pounds of Roe	Estimated Harvest[c]
1	392	16,694	0	16,694	23,965	0	23,965	130,525	0	130,525	36,533	0	36,533
2	228	13,413	0	13,413	8,313	0	8,313	0	0	0	0	0	0
Subtotal	582	30,107	0	30,107	32,278	0	32,278	130,525	0	130,525	36,533	0	36,533
3		No commercial fishing in 2005											
Total Lower Yukon	582	30,107	0	30,107	32,278	0	32,278	130,525	0	130,525	36,533	0	36,533
Anvik River	0	0	0	0	0	0	0	0	0	0	0	0	0
4-A	0	0	0	0	0	0	0	0	0	0	0	0	0
4-BC	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal District 4[d]	0	0	0	0	0	0	0	0	0	0	0	0	0
5-ABC	12	1,469	0	1,469	0	0	0	0	0	0	0	0	0
5-D	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal District 5	12	1,469	0	1,469	0	0	0	0	0	0	0	0	0
6	9	453	0	453	8,986	0	8,986	49,637	0	49,637	21,778	0	21,778
Total Upper Yukon	21	1,922	0	1,922	8,986	0	8,986	49,637	0	49,637	21,778	0	21,778
Total Alaska	**603**	**32,029**	**0**	**32,029**	**41,264**	**0**	**41,264**	**180,162**	**0**	**180,162**	**58,311**	**0**	**58,311**

Note: See Appendix A1-A7 and A10. See Appendix Figures A1-A5 and A8.

[a] Does not include ADF&G test fishery sales.

[b] Number of unique permits fished by district, subdistrict or area. Totals by area may not add up due to transfers between districts or subdistricts.

[c] Unless otherwise noted, estimated harvest is the number of fish sold in the round plus the estimated number of females harvested to produce roe sold (pounds of roe sold divided by weighted average roe weight per female).

[d] Estimated harvest includes both males and females harvested to produce roe sold (pounds of roe sold divided by weighted average roe weight per female divided by average percent females in the harvest). Summer chum salmon sold in the round in District 4 are assumed to be males and are included in the estimated harvest calculation.

Table 2.–Pilot Station sonar project estimates, Yukon River drainage, 1995, 1997-2005[a].

Species	Total Passage									
	2005	2004	2003	2002	2001	2000	1999	1998	1997b	1995
Large Chinook[c]	142,511	110,236	245,037	92,584	85,511	39,233	127,809	71,177	118,121	130,271
Small Chinook	17,473	46,370	23,500	30,629	13,892	5,195	16,914	16,675	77,526	32,674
Chinook Total	159,984	156,606	268,537	123,213	99,403	44,428	144,723	87,852	195,647	162,945
Summer Chum	2,442,878	1,357,826	1,168,518	1,088,463	441,450	456,271	973,708	826,385	1,415,641	3,556,445
Fall Chum[d]	1,812,824	594,060	889,778	326,858	376,182	247,935	379,493	372,927	506,621	1,053,245
Chum Total	4,255,702	1,951,886	2,058,296	1,415,321	817,632	704,206	1,353,201	1,199,312	1,922,262	4,609,690
Coho[d]	184,281	188,350	269,081	122,566	137,769	175,421	62,521	136,906	104,343	101,806
Other Species[e]	632,236	880,632	507,534	622,670	354,096	396,723	467,316	344,317	624,236	1,036,459
Season Total	5,232,203	3,177,474	3,103,448	2,283,770	1,408,900	1,320,778	2,027,761	1,768,387	2,846,488	5,910,900

[a] Estimates for all years were generated with the most current apportionment model and may differ from earlier estimates.

[b] The Yukon River sonar project did not operate at full capacity in 1996 and therefore there are no passage estimates.

[c] Chinook salmon >655 mm for 1999- 2005, >700mm for 1995-1998.

[d] This estimate may not include the entire run.

[e] Includes pink and sockeye salmon, cisco, whitefish, sheefish, burbot, suckers, Dolly Varden, and northern pike.

Table 3.– The Yukon River drainage summer chum salmon management plan overview, 2005.

Projected Run Size [a]	Required Management Actions Summer Chum Salmon Directed Fisheries			
	Commercial	Personal Use	Sport	Subsistence
600,000 or Less	Closure	Closure	Closure	Closure [b]
600,000 to 700,000	Closure	Closure	Closure	Possible Restrictions [c]
700,001 to 1,000,000	Restrictions [d]	Restrictions [e]	Restrictions [e]	Normal Fishing Schedules
Greater Than 1,000,000	Open [f]	Open	Open	Normal Fishing Schedules

[a] passage estimates, test fisheries indices, subsistence and commercial fishing reports, and passage estimates from escapement monitoring projects to assess the run size.

[b] The department may, by emergency order, open subsistence chum salmon directed fisheries where indicators show that the escapement goal(s) in that area will be achieved.

[c] The department shall manage the fishery to achieve drainage wide escapement of no less than 600,000 summer chum salmon, except that the department may, by emergency order, open a less restrictive directed subsistence summer chum fishery in areas that indicator(s) show that the escapement goal(s) in that area will be achieved.

[d] The department may, by emergency order, open commercial fishing in areas that show the escapement goal(s) in that area will be achieved.

[e] The department may, by emergency order, open personal use and sport fishing in areas that indicator(s) show the escapement goal(s) in that area will be achieved.

[f] The department may open a drainage-wide commercial fishery with the harvestable surplus distributed by district or subdistrict in proportion to the guideline harvest levels established in 5 AAC 05.362. (f) and (g).

Table 4.–The Yukon River drainage fall chum salmon management plan, 5 AAC 01.249, 2005.

Run Size Estimate [b] (Point Estimate)	Recommended Management Action [a] Fall Chum Salmon Directed Fisheries				Targeted Drainagewide Escapement
	Commercial	Personal Use	Sport	Subsistence	
300,000 or Less	Closure	Closure	Closure	Closure [c]	
300,001 to 500,000	Closure	Closure [c]	Closure [c]	Possible Restrictions [c&d]	300,000 to 600,000
500,001 to 600,000	Restrictions [c]	Open	Open	Pre-2001 Fishing Schedules	
Greater Than 600,000	Open [e]	Open	Open	Pre-2001 Fishing Schedules	

[a] Considerations for the Toklat River and Canadian Mainstem rebuilding plans may require more restrictive management actions.

[b] The department will use the best available data (including preseason projections, mainstem river sonar passage estimates, test fisheries indices, subsistence and commercial fishing reports, and passage estimates from escapement monitoring projects).

[c] The fisheries may be opened or less restrictive in areas that indicator(s) suggest the escapement goal(s) in that area will be achieved.

[d] Subsistence fishing will be managed to achieve a minimum drainage-wide escapement goal of 300,000.

[e] Drainagewide commercial fisheries may be open and the harvestable surplus above 600,000 will be distributed by district or subdistrict (in proportion to the guidelines harvest levels established in 5 AAC 05.365 and 5 AAC 05.367).

Table 5.–Canadian weekly commercial catches of Chinook, chum and coho salmon in the Yukon River in 2005.

Statistical Week	Week Ending	Start Date	Finish Date	Days Fished	Number Fishing	Boat Days	Chinook Salmon	Chum Salmon	Coho Salmon
29	16-Jul	10-Jul	12-Jul	2	11.0	22	407	0	0
30	23-Jul	17-Jul	19-Jul	2	11.0	22	920	0	0
31	30-Jul	24-Jul	28-Jul	4	10.3	41	1,829	1	0
32	06-Aug	31-Jul	04-Aug	4	6.3	25	722	5	0
33	13-Aug	07-Aug	11-Aug	4	1.0	4	95	6	0
34	20-Aug			0	0.0	0			
35	27-Aug			0	0.0	0			
36	03-Sep	27-Aug	01-Sep	5	1.8	9	12	774	0
37	10-Sep	03-Sep	10-Sep	7	1.0	7	10	897	0
38	17-Sep	10-Sep	17-Sep	7	0.9	6	2	2,229	0
39	24-Sep	17-Sep	24-Sep	7	1.7	12	0	2,218	0
40	01-Oct	24-Sep	01-Oct	7	1.3	9	0	4,259	0
41	08-Oct	01-Oct	08-Oct	7	1.4	10	0	1,271	0
42	15-Oct	08-Oct	15-Oct	7	0.4	3	1	271	0
Dawson Area Subtotal				63	48.1	170	3,998	11,931	0
Upriver Commercial Subtotal							68	0	0
TOTAL COMMERCIAL HARVEST							4,066	11,931	0
Chinook Test Fishery and Chum Live Release Test (Not Conducted in 2005)									
Domestic Harvest							65	0	0
Estimated Recreational Harvest							173	0	0
Aboriginal Fishery Catch							6,376	1,800	0
TOTAL UPPER YUKON HARVEST							10,680	13,731	0
Old Crow Aboriginal Fishery							394	4,593	11
Old Crow Test Fishery (all fish were released)									

Table 6.–Salmon fishery projects conducted in the Alaskan portion of the Yukon River drainage in 2005.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Commercial Catch and Effort Assessment	Alaskan portion of the Yukon River drainage	document and estimate the catch and associated effort of the Alaskan Yukon River commercial salmon fishery via receipts (fish tickets) of commercial sales of salmon or salmon roe.	June - Sept.	ADF&G	all aspects
Commercial Catch Sampling and Monitoring	Alaskan portion of the Yukon River drainage	determine age, sex, and size of salmon harvested in Alaskan Yukon River commercial fisheries; monitor Alaskan commercial fishery openings and closures.	June - Sept.	ADF&G ADPS	all aspects enforcement
Subsistence and Personal Use Catch and Effort Assessment	Alaskan portion of the Yukon River drainage	document and estimate the catch and associated effort of the Alaskan Yukon River subsistence salmon fishery via interviews, catch calendars, mail-out questionnaires, telephone interviews, and subsistence fishing permits, and of the personal use fishery personal use fishery permits.	ongoing	ADF&G	all aspects
Sport Catch, Harvest and Effort Assessment	Alaskan portion of the Yukon River drainage	document and estimate the catch, harvest, and associated effort of the Alaskan Yukon River sport fishery via post-season mail-out questionnaires.	post season	ADF&G	all aspects
Yukon River Chinook Microsatellite Baseline	Yukon River drainage	Survey standardized microsatellites and Yukon River Chinook salmon populations	ongoing	ADF&G DFO	US populations Canada populations
Yukon River Salmon Stock Identification	Yukon River drainage	estimate Chinook salmon stock composition of the various Yukon River drainage harvests through genetic stock identification, age compositions, and geographical distribution of catches and escapements	ongoing	ADF&G	all aspects
Yukon River Chum and Chinook Mixed-Stock Analysis	Pilot Station	estimate the stock compositions of Chum and Chinook salmon using samples collected from Pilot Station sonar test fisheries	May-Aug	USFWS	
Yukon River Coho Salmon Population Structure	Yukon River drainage	assess the genetic diversity and population structure of Coho salmon using samples collected from 11 locations distributed throughout the Yukon River	ongoing	USFWS	all aspects
YRDFA Weekly Teleconference	Yukon River drainage	acts as a forum for fishers along the Yukon River to interact with state and federal managers for the collection and dissemination of fisheries information	May - Sept.	YRDFA	all aspects
Lower Yukon River Set Gillnet Test Fishing	South, Middle, and North mouths of the Yukon River delta, RM 20	index Chinook and summer chum salmon run timing and abundance using set gillnets. sample captured salmon for age, sex, size composition information.	June - Aug.	ADF&G	all aspects

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Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Lower Yukon River Drift Test Fishing	South, Middle, and North mouths of the Yukon River delta, RM 20	index Chinook, summer and fall chum, and coho salmon run timing and abundance using drift gillnets. sample captured salmon for age, sex, size composition information.	June - Aug.	ADF&G	all aspects
Mountain Village Drift Gillnet Test Fishing	mainstem Yukon River, RM 87	index fall chum and coho salmon run timing and relative abundance using drift gillnets. sample captured salmon for age, sex, size composition information.	July - Sept.	Asa'carsarmiut Trad. Council	all aspects implementation with R & E
East Fork Weir, Andreafsky River	mile 20 East Fork RM 124	estimate daily escapement, with age, sex and size composition, of Chinook, summer chum, and coho salmon into the East Fork of the Andreafsky River.	June - Sept.	USFWS Yupiit of Andreafsky Algaaciq Tribal Council	all aspects partial funding from BSFA Aug.-Sept.
		determine feasibility of using video and time-lapse photography to improve escapement monitoring	July - Sept.	USFWS	partial funding from R & E
Yukon River Sonar	Pilot Station, RM 123	estimate Chinook and summer and fall chum salmon passage in the mainstem Yukon River. Apportionment of species including coho salmon and other finfish.	June - Aug.	ADF&G AVCP	all aspects
Lower Yukon Chum Salmon Genetic Sampling	Pilot Station, RM 123; RM 20	fin clips were taken from chum salmon at Pilot Station from July 1 to August 31 and forwarded to USFWS for analysis.	July-Aug	ADF&G	all aspects
Inseason Subsistence Monitoring	Alaskan portion of the Yukon River	collects harvest and effort information from subsistence users in the Alaskan portion of the Yukon River drainage through interviews with fishers.	May - Sept.	USFWS	all aspects
Anvik River Sonar	mile 40 Anvik River, RM 358	estimate daily escapement of summer chum salmon to the Anvik River; estimate age, sex, and size composition of the summer chum salmon escapement.	June - July	ADF&G	all aspects
Kaltag Creek Tower	mile 1 Kaltag Creek, RM 451	estimate daily escapement of Chinook and summer chum salmon into Kaltag Creek; estimate age, sex, and size composition of the summer chum salmon escapement.	June - July	City of Kaltag ACES BSFA	all aspects provided funding provided funding R&E funding
Gisasa River Weir	mile 3 Gisasa River, Koyukuk River drainage, RM 567	estimate daily escapement of Chinook and summer chum salmon into the Gisasa River; estimate age, sex, and size composition of the Chinook and summer chum salmon escapements.	June - Aug.	USFWS	all aspects

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Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Clear Creek Weir	mile 0 Clear Creek, Hogotza River drainage, Koyukuk River drainage, RM ~ 780	estimate daily escapement of summer chum salmon into Clear Creek; estimate age, sex, and size composition of the summer chum salmon escapement.	June - Aug	BLM	all aspects
Henshaw Creek Weir	mile 1 Henshaw Creek, RM 976	estimate daily escapement of Chinook and summer chum salmon into Henshaw Creek; estimate age, sex, and size composition of the Chinook and summer chum salmon escapements.	June - Aug.	TCC BSFA USFWS-OSM	all aspects Federal Subsistence Funding funding
Chandalar River Sonar	mile 14 Chandalar River, RM 996	Feasibility to estimate Chinook salmon passage.	July	USFWS	all aspects
Chandalar River Sonar	mile 14 Chandalar River, RM 996	estimate fall chum salmon passage using split-beam sonar in the Chandalar River. investigate feasibility of using underwater video to document the presence of non-salmon fish species. Estimate sex and size composition of fall chum salmon escapement. Collected ASL data including vertebrae.	Aug. - Sept.	USFWS	all aspects
Sheenjek River Sonar	mile 6 Sheenjek River, Porcupine River drainage, RM 1,060	estimate daily escapement of fall chum salmon into the Sheenjek River using DIDSON sonar and counted both left and right banks. estimate age, sex, and size composition of the fall chum salmon escapement.	Aug. - Sept.	ADF&G	all aspects
Eagle Sonar	Mainstem Yukon River Eagle, RM 1,213	estimate daily passage of Chinook salmon in the mainstem Yukon River using both split-beam and DIDSON.	Jul.-Aug.	ADF&G DFO	all aspects technical support
Kaltag Village Drift Gillnet Test Fishing	Mainstem Yukon River Kaltag, RM 451	index fall chum and coho salmon run timing and relative abundance using drift gillnets. sample captured salmon for age, sex, size composition information.	July - Sept.	City of Kaltag	all aspects implementation with R & E
Middle Yukon River Chinook Sampling Project	Mainstem Yukon River Kaltag, RM 451	estimate age, sex, and size composition of Chinook salmon harvested in middle Yukon River subsistence fisheries	June - July	City of Kaltag USFWS-OSM	all aspects implementation with R & E funding
Nenana River Escapement Surveys	Nenana River drainage, above RM 860	aerial and ground surveys for numbers and distribution of coho and chum salmon in ten tributaries of the Nenana below Healy Creek.	Sept. - Oct.	ADF&G YRDFA	all aspects funding

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Table 6.–Page 4 of 6.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Tanana Village South bank Yukon River Fish Wheel, Test Fishing	Mainstem Yukon River Tanana, RM 695	index the timing of Chinook, summer and fall chum, and coho salmon on the south bank of the Yukon River bound for the Tanana River drainage, using test fish wheel equipped with video monitoring systems.	Aug. - Sept.	ADF&G USFWS	all aspects R & E partial funding all aspects
Rapids Fish Wheel Test Fishing	Mainstem Yukon River RM 730	index run timing of Chinook and fall chum salmon runs as well as non-salmon species using video monitoring techniques.	June-Sept.	USFWS Zuray	Federal Subsistence Funding R&E and Federal Sub Funding
Rapids/Rampart Mark-recapture	Mainstem Yukon River RM 730	provides a mark-recapture abundance estimate for fall chum salmon within the Upper Yukon River drainage.	July - Sept.	USFWS Zuray	all aspects contracted operator
Rampart Fish Wheel Test Fishing	Mainstem Yukon River RM 763	index the timing of fall chum salmon using test fish wheel. recovers tags from the Rapids mark-recapture project to estimate fall chum salmon abundance using video monitoring techniques as an alternate to live boxes to estimate catch-per-unit effort on fish wheels as well as testing feasibility of using color coded tags for the mark-recapture estimate.	July -Sept.	USFWS Zuray	all aspects
Nenana Test Fish Wheel Test Fishing	mainstem Tanana River Nenana, RM 860	index the timing of Chinook, summer chum, fall chum, and coho salmon runs using test fish wheels. Tag recovery fish wheel for fall chum salmon for Tanana Tagging mark-recapture project.	June - Sept.	ADF&G BSFA	all aspects partial funding
Tanana Tagging Mark-recapture	mainstem Tanana River between RM 793 and 860.	estimate the population size of the Tanana River fall chum salmon run above the confluence of the Kantishna River using mark-recapture methodology;	Aug. - Sept.	ADF&G BSFA	all aspects provided partial funding
Tozitna River Weir	Mile 50 Tozitna River Yukon River, RM 681	estimate daily escapement of Chinook and summer chum salmon into the Tozitna River, estimate age, sex and size comp of the Chinook and summer chum escapement	June-Aug.	BLM TTC	all aspects
Toklat River Ground Survey	Toklat River, between RM 848 and 853	estimate fall chum spawning escapement in Tolkat Springs and vicinity. recover tags from Kantishna mark-recapture program. Sample fall chum salmon carcasses for age, sex, and size composition information.	mid-Oct.	ADF&G	all aspects
Toklat River Tag Recovery	Toklat River Recovery RM 848	index run timing of fall chum and coho salmon using test fish wheels. recover tags from fall chum salmon for the Kantishna mark-recapture project.	Aug - Oct.	ADF&G	all aspects
Kantishna River Mark-recapture	Kantishna River RM 800	provides a mark-recapture abundance estimate for fall chum salmon within the Kantishna River drainage.	Aug - Oct.	ADF&G BSFA	all aspects funding for tagging fish wheel

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Table 6.–Page 5 of 6.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Kantishna River Tag Recovery	Kantishna River RM 880	index run timing of fall chum and coho salmon using a test fish wheel. recover tags from fall chum salmon for the Kantishna mark-recapture project.	Aug. - Oct.	ADF&G NPS	all aspects funding for fish wheel contract
Delta River Ground Surveys	Tanana River drainage, RM 1,031	estimate fall chum spawning escapement in Delta River. recover tags from Upper Tanana mark-recapture program. Sample fall chum salmon carcasses for age, sex, and size composition information.	Oct.-Dec.	ADF&G	all aspects
Chena River Tower	mile 1 Chena River, Tanana River drainage, RM 921	estimate daily escapement of Chinook and summer chum salmon into the Chena River.	July - Aug.	ADF&G	all aspects
Salcha River Tower	mile 2 Salcha River, Tanana River drainage, RM 967	estimate daily escapement of Chinook and chum salmon into the Salcha River.	July - Aug.	BSFA	all aspects implementation with R & E
Chinook Fecundity Study	Alaskan portion of the Yukon River drainage	determine and compare the fecundity of female Chinook salmon from Tanana River and mainstem mixed stocks. collect weight and girth measurements to include with ASL data	July - Sept.	ADF&G	all aspects implementation with US R & M funds
Upper Yukon River Chum Salmon Genetic Stock Identification	Yukon River drainage	establish the feasibility of using DNA marks for genetic stock identification of chum salmon in the Yukon River.	June - Oct	USFWS	all aspects
Effects of *Ichthyophonus* on Survival and Reproductive Success	Emmonak, RM 20, Tanana River drainage, Chena River RM 902 and Salcha River RM 965	Determine the effects of *Ichthyophonus* on survival and reproductive success in Chinook salmon in the Yukon River.	June-Dec.	ADF&G	all aspects, funding
Marshal Test Fish	Mainstem Yukon River near the village of Marshal	index Chinook, summer and fall chum, and coho salmon run timing and abundance using drift gillnets. sample captured salmon for age, sex, size composition information.	June - July	AVCP	all aspects
Sex-ratios of Adult Chinook Salmon	Gisasa River	Investigate if sex-reversal is causing the skewed sex ratios reported at weirs on the Yukon River through the comparison of genotypic and phenotypic gender of adult Chinook salmon.	June- July	USFWS, USFWS OSM, U of I	all aspects, funding

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Table 6.–Page 6 of 6.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Contaminants Study (Final report will complete this project)	Yukon River drainage	Checking for 20 metals, organic chlorines, DDT, PCBs, sex hormones, vitelegonin (egg yolk protein), histology, Ichthyophonous in Chinook, erod marker (induced when exposed to dioxin contaminants), H4IIE, vitamins, extra Y chromosome (on Columbia River having same researcher Nagler U of Idaho doing similar study in the Yukon River drainage)	ongoing	USFWS USGS-BRD	all aspects
Yukon River Inseason Salmon Harvest Interviews	Emmonak, Holy Cross, Nulato, Huslia, Galena, and Beaver Primary	Collect qualitative inseason subsistence salmon harvest information through weekly interviews	June-Sept	USFWS/YRDFA	all aspects
Migratory Timing and Harvest Information of Chinook Salmon Stocks	Yukon River drainage	Enlarge existing allozyme and develop a DNA database to characterize the genetic diversity of Chinook salmonin the Yukon River within the U.S. and Canada.	June-Aug.	USFWS, ADFG, DFO, USFWS-OSM	U.S. collections, microsatellites, allozyme, microsatellites Can. collections, microsatellites funding

Agency Acronyms:

ACES = Alaska Cooperative Extension Service
ADF&G = Alaska Department of Fish and Game
ADPS = Alaska Department of Public Safety
AVCP = Association of Village Council Presidents, Inc.
BSFA = Bering Sea Fishermen's Association
BLM = Bureau of Land Management
CATG = Council of Athabascan Tribal Governments
DFO = Department of Fisheries and Oceans (Canada)
NMFS = National Marine Fisheries Service
NTC = Nulato Tribal Council
TCC = Tanana Chiefs Conference, Inc.
TTC = Tanana Tribal Council
U of I = University of Idaho
U of W = University of Washington
USFWS = United States Fish and Wildlife Service
USFWS-OSM = United States Fish and Wildlife Service, Office of Subsistence Management
USGS-ACS = United States Geological Survey - Alaska Science Center
USGS-BRD = United States Geological Survey - Biological Resource Division
YRDFA = Yukon River Drainage Fisheries Association

Table 7.–List of harvest/escapement monitoring and incubation/rearing projects involving salmon in the Canadian portion of the Yukon River drainage in 2005.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Upper Yukon Tagging Program	downstream of the Stewart River	- to obtain population, and escapement estimates of Chinook and chum salmon in the Canadian section of the mainstem Yukon River - to collect stock ID, age, size, sex composition data - to participate in Eagle Sonar Program	June - Oct	DFO	all aspects
Chinook and Chum Test Fishery Fisheries	near Dawson City	- to provide catch and tag recovery information for the mark recapture program as required (not required in 2005) - to provide AWL samples - the Chinook test fishey uses nets while the chum test uses fish wheels and a live release technique	July-Oct	YRCFA, THFN	all aspects
Commercial Catch Monitoring	near Dawson City	- to determine weekly catches and effort in the Canadian commercial fishery; recovery of tags - to provide AWL information and DNA samples	July - Oct	DFO	all aspects
Aboriginal Catch Monitoring	Yukon communities	- to determine weekly catches and effort in the aboriginal fishery; and recover tags - to implement components of the UFA	July - Oct	YFN's DFO	joint project
Rcreational Catch Monitoring	Yukon tributaries	- to detrmine the recretation harvest, landed and retained, of salmon caught in the Yukon T through a catch card program	June-Oct	YSC/DFO	all aspects
DFO Escapement Index Surveys	Chinook and chum aerial index streams	- to obtain counts in index areas including: Big Salmon, L. Salmon Wolf, Nisutlin, Mainstem Yukon, Kluane & Teslin rivers	Aug - Nov	DFO	all aspects
Escapement Surveys	throughout upper Yukon R. drainage	- to conduct surveys of spawning fish by foot, boat and aerial etc. - to enumerate chum salmon in Minto area - to enumerate chum salmon in Telin River and Teslin Lake area	July - Oct	various R&E Fund recipients and YFN's including SFN TTC	all aspects
Fishing Branch Chum Salmon Weir	Fishing Branch R.	- to enumerate chum salmon returning to the Fishing Branch River and obtain age size, tag and sex composition data	Aug - Oct	DFO VGG	joint project
Whitehorse Rapids Fishway	Whitehorse	- to enumerate wild and hatchery reared chinook returns to the Whitehorse area and obtain age, size, sex and tag composition data	July - Aug	YFGA	all aspects

-continued-

Table 7.–Page 6 of 6.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Blind Creek Weir	Pelly River	- enumerate chinook return and recover tags	July-Aug	JW&A RRDC	all aspects
Big Salmon Sonar	Big Salmon River	- installation and operation of a DIDSON sonar program	July-Aug	JW&A M&A	all aspects
Escapement Sampling	various tributaries	- to obtain age and size composition, and DNA samples	Aug -Oct	DFO	all aspects
Porcupine Mark-Recapture Program	Porcupine River	- conduct chum marking and test fishery porgram - establish method of conducting in-season local management	Aug -Oct	VGG & EDI	all aspects
Porcupine River Coho Radio Telemetry Program	Porcupine Drainage	- to track coho salmon tagged with transmitters at Old Crow using aerial tracking	Oct-March	VGG & EDI	all aspects
Whitehorse Rapids Fish Hatchery and Coded-Wire Tagging Project	Whitehorse	- to incubate ~150K chinook eggs obtained at the Whitehorse Fishway - to rear fry until spring, then mark, tag, and release upstream of Whitehorse hydroelectric facility	ongoing	RR, YEC YFGA DFO	all aspects coded-wire tagging
MacIntyre Incubation Box and Coded-Wire Tagging Project	Whitehorse	- to incubate up to 120K chinook fry obtained from the Takhini River and/or Tatchun Creek - to rear fry to taggable size, then mark, tag, and release at natal site	ongoing	DFO YC NRI	technical support field work, project monitoring

Acronyms:
DFO = Department of Fisheries and Oceans Canada
EDI = Environmental Dynamics Incorportaed
JW&A = Jane Wilson & Associates
M&A = Mercer and Asociates Ltd.
NRI = Northern Research Institute
RR= Government of Yukon- Renewable Resources
RRDC = Ross River Dena Council
SFN = Selkirk First Nation
THFN = Tr'ondek Hwech'in First Nation
TTC = Teslin Tlingit Council
UFA = Umbrella Final Agreement
VGG = Vuntut Gwitchin Government
YC = Yukon College
YEC = Yukon Energy Corporation
YFN's = Yukon First Nation's
YFGA = Yukon Fish and Game Association
YRCFA = Yukon River Commercial Fishers Association
YSC = Yukon Salmon Committee

Table 8.–Yukon River Canadian Chinook salmon total run by brood year, and escapement by year, 1982-1997 and R/S. (8-year-olds for Brood Year 1997 are projected).

Brood Year	Age Group by Brood Year						Total	Escapement	Return per Spawner
	3	4	5	6	7	8			
1974						596			
1975					27,200	162			
1976				75,458	21,106	30			
1977			15,435	106,526	16,170	593			
1978		3,616	15,339	51,614	22,839	1,137			
1979	1,534	1,588	16,001	80,761	39,130	851	139,865		
1980	15	4,830	10,412	58,878	27,604	3,409	105,149		
1981	0	1,050	29,283	97,369	49,078	1,348	178,128		
1982	0	5,083	13,907	32,119	20,417	333	71,860	19,790	3.63
1983	560	6,282	31,679	68,304	13,109	134	120,067	28,989	4.14
1984	69	12,586	28,842	61,587	10,590	114	113,788	27,616	4.12
1985	223	10,160	34,439	49,236	4,171	91	98,319	10,730	9.16
1986	347	20,207	40,128	99,601	14,798	138	175,220	16,415	10.67
1987	0	2,309	30,007	63,126	8,298	18	103,759	13,260	7.82
1988	0	6,491	32,390	60,038	7,393	68	106,380	23,118	4.60
1989	61	13,392	67,329	114,480	19,778	0	215,040	25,201	8.53
1990	45	6,185	22,833	48,488	8,585	9	86,145	37,699	2.29
1991	357	6,635	66,054	109,487	8,532	0	191,067	20,743	9.21
1992	6	2,459	22,318	33,018	1,285	0	59,087	25,382	2.33
1993	6	5,172	27,364	63,446	4,272	0	100,259	28,558	3.51
1994	0	596	17,381	21,597	5,455	11	45,041	25,890	1.74
1995	16	1,666	10,012	47,225	11,379	11	70,310	32,262	2.18
1996	6	162	21,329	59,680	11,242	2	92,421	28,409	3.25
1997	7	3,535	32,471	73,261	6,912	75	116,261	37,683	3.09
1998	0	7,422	31,499	69,840				16,750	
1999	107	1,544	26822					11,362	
2000	0	5564						11,344	
2001	0							42,438	
2002								40,145	
2003								47,486	
Average (1982-1997)							110,314	25,109	

Contrast	3.5

Table 9.–Chinook salmon age and sex percentages from selected Yukon River escapement projects, 2005.

Location	Sample Size		Age 3	4	5	6	7	8	Total
Anvik River [a]	227	Males	0.0	8.8	30.8	8.8	0.4	0.0	48.9
		Females	0.0	0.0	30.4	18.9	1.8	0.0	51.1
		Total	0.0	8.8	61.2	27.8	2.2	0.0	100.0
Chena River [a]	553	Males	0.0	6.3	32.9	16.8	1.6	0.0	57.6
		Females	0.0	0.2	17.0	22.7	2.5	0.0	42.4
		Total	0.0	6.5	49.9	39.5	4.1	0.0	100.0
East Fork	389	Males	0.0	12.2	31.2	6.4	0.0	0.0	49.8
Andreafsky River [b]		Females	0.0	2.8	33.1	13.8	0.5	0.0	50.2
		Total	0.0	15.0	64.3	20.2	0.5	0.0	100.0
Gisasa River [b]	591	Males	0.0	25.1	37.0	3.9	0.0	0.0	66.0
		Females	0.0	3.4	18.3	11.9	0.4	0.0	34.0
		Total	0.0	28.5	55.3	15.8	0.4	0.0	100.0
Henshaw Creek [b]	127	Males	0.0	21.9	29.2	7.5	0.0	0.0	58.6
		Females	0.0	6.0	20.1	15.3	0.0	0.0	41.4
		Total	0.0	27.9	49.3	22.8	0.0	0.0	100.0
Salcha River [a]	602	Males	0.0	9.3	23.6	12.1	0.7	0.0	45.7
		Females	0.0	0.0	17.9	34.1	2.3	0.0	54.3
		Total	0.0	9.3	41.5	46.2	3.0	0.0	100.0
Tozitna River [b]	296	Males	0.1	29.0	43.7	0.0	0.0	0.0	72.8
		Females	0.0	0.0	26.5	0.7	0.0	0.0	27.2
		Total	0.1	29.0	70.2	0.7	0.0	0.0	100.0

[a] Samples were collected from carcasses.

[b] Samples were collected from a weir trap.

Table 10.–Total Yukon River Chinook salmon harvest proportion by stock group, by year, 1981-2005.

			Upper [d]		
Year [a]	Lower [b]	Middle [c]	U.S.	Canada	Total
1981	0.054	0.545	0.313	0.088	0.401
1982	0.139	0.247	0.513	0.101	0.614
1983	0.129	0.337	0.446	0.087	0.533
1984	0.253	0.402	0.251	0.094	0.345
1985	0.276	0.223	0.409	0.092	0.501
1986	0.195	0.096	0.587	0.122	0.709
1987	0.159	0.196	0.560	0.086	0.645
1988	0.218	0.158	0.498	0.126	0.625
1989	0.244	0.159	0.494	0.102	0.597
1990	0.202	0.252	0.433	0.114	0.547
1991	0.280	0.253	0.349	0.118	0.467
1992	0.163	0.218	0.523	0.096	0.619
1993	0.215	0.254	0.439	0.092	0.531
1994	0.182	0.214	0.494	0.110	0.604
1995	0.179	0.224	0.492	0.105	0.597
1996	0.210	0.104	0.562	0.124	0.686
1997	0.264	0.168	0.482	0.086	0.569
1998	0.327	0.174	0.442	0.056	0.498
1999	0.401	0.063	0.445	0.091	0.536
2000	0.339	0.123	0.441	0.097	0.538
2001	0.316	0.160	0.365	0.159	0.524
2002	0.194	0.292	0.393	0.121	0.514
2003	0.068	0.289	0.554	0.089	0.643
2004 [e]	0.140	0.281	0.488	0.091	0.579
2005 [f]					
(1981-2003)	0.218	0.224	0.456	0.102	0.558

[a] Methods used for stock identification from 1981 through 2003 were based on scale pattern analysis. Stock identification was based on genetic analysis in 2004.

[b] From 1981 through 2003, the Lower River stock group included Koyukuk River stocks downstream from and including the Gisasa River, and those stocks spawning downstream from the Koyukuk River. In 2004, the Lower River stock group included Koyukuk River stocks downstream from and including the Gisasa River, those stocks spawning downstream from the Koyukuk River, and those stocks spawning in Yukon River mainstem tributaries between the Koyukuk and Tanana rivers.

[c] From 1981 through 2003, the Middle River stock group included all Tanana River stocks, all Koyukuk River stocks upstream from the Gisasa River, and those stocks spawning in Yukon River mainstem tributaries between the Koyukuk and Tanana rivers. In 2004, the Middle River stock group included all Tanana River stocks, all Koyukuk River stocks upstream from the Gisasa River, and those stocks spawning in Alaskan tributaries upstream of the Yukon River and Tanana River confluence.

[d] From 1981 through 2003, the Upper River stock group included all stocks spawning upstream from the Yukon River and Tanana River confluence and assumed these fish were bound for Canada. In 2004, the Upper River stock group included all Yukon River stocks spawning upstream from Fort Yukon and assumed these fish were bound for Canada.

[e] Lower, Middle, and Upper stock group boundaries changed in 2004 based on genetic analysis. Commercial harvest samples collected in 2004 from Subdistricts 5-B and 5-C included Lower and Middle stock groups. Previously, fish harvested in these subdistricts were assumed to belong to the Upper stock group only. Genetic analysis is ongoing to further define stock group boundaries in the Alaskan portion of the drainage above the Yukon River and Tanana River confluence.

[f] 2005 data are not available.

Table 11.–Yukon River Chinook salmon harvest proportion by stock group in Alaska.

	Stock Group		
Year [a]	Lower [b]	Middle [c]	Upper [d]
1981	0.059	0.598	0.343
1982	0.154	0.275	0.571
1983	0.142	0.370	0.489
1984	0.280	0.443	0.277
1985	0.304	0.246	0.451
1986	0.223	0.109	0.668
1987	0.174	0.214	0.612
1988	0.249	0.181	0.570
1989	0.272	0.177	0.551
1990	0.228	0.284	0.488
1991	0.318	0.287	0.396
1992	0.180	0.241	0.578
1993	0.237	0.280	0.483
1994	0.204	0.241	0.555
1995	0.200	0.250	0.550
1996	0.240	0.118	0.642
1997	0.289	0.183	0.528
1998	0.347	0.185	0.468
1999	0.441	0.069	0.490
2000	0.375	0.136	0.489
2001	0.375	0.190	0.435
2002	0.221	0.333	0.446
2003	0.075	0.317	0.608
2004 [e]	0.154	0.309	0.537
2005 [f]			
Average (1981-2003)	0.243	0.249	0.508

[a] Methods used for stock identification from 1981 through 2003 were based on scale pattern analysis. Stock identification was based on genetic analysis in 2004.

[b] From 1981 through 2003, the Lower River stock group included Koyukuk River stocks downstream from and including the Gisasa River, and those stocks spawning downstream from the Koyukuk River. In 2004, the Lower River stock group included Koyukuk River stocks downstream from and including the Gisasa River, those stocks spawning downstream from the Koyukuk River, and those stocks spawning in Yukon River mainstem tributaries between the Koyukuk and Tanana rivers.

[c] From 1981 through 2003, the Middle River stock group included all Tanana River stocks, all Koyukuk River stocks upstream from the Gisasa River, and those stocks spawning in Yukon River mainstem tributaries between the Koyukuk and Tanana rivers. In 2004, the Middle River stock group included all Tanana River stocks, all Koyukuk River stocks upstream from the Gisasa River, and those stocks spawning in Alaskan tributaries upstream of the Yukon River and Tanana River confluence.

[d] From 1981 through 2003, the Upper River stock group included all stocks spawning upstream from the Yukon River and Tanana River confluence and assumed these fish were bound for Canada. In 2004, the Upper River stock group included all Yukon River stocks spawning upstream from Fort Yukon and assumed these fish were bound for Canada.

[e] Lower, Middle, and Upper stock group boundaries changed in 2004 based on genetic analysis. Commercial harvest samples collected in 2004 from Subdistricts 5-B and 5-C included Lower and Middle stock groups. Previously, fish harvested in these subdistricts were assumed to belong to the Upper stock group only. Genetic analysis is ongoing to further define stock group boundaries in the Alaskan portion of the drainage above the Yukon River and Tanana River confluence.

[f] 2005 data are not available.

Table 12.–Upper stock group proportion, by country, from the Yukon River Chinook salmon harvest.

	Upper Stock Group	
Year [a]	Alaska	Canada
1981	0.781	0.219
1982	0.835	0.165
1983	0.837	0.163
1984	0.727	0.273
1985	0.816	0.184
1986	0.827	0.173
1987	0.867	0.133
1988	0.798	0.202
1989	0.829	0.171
1990	0.792	0.208
1991	0.748	0.252
1992	0.845	0.155
1993	0.826	0.174
1994	0.818	0.182
1995	0.824	0.176
1996	0.819	0.181
1997	0.848	0.152
1998	0.888	0.112
1999	0.830	0.170
2000	0.819	0.181
2001	0.698	0.303
2002	0.763	0.235
2003	0.862	0.138
2004 [b]	0.843	0.157
2005 [c]		
Average (1981-2003)	0.813	0.187

[a] Methods used for stock identification from 1981 through 2003 were based on scale pattern analysis. During these years, the Upper River stock group included all stocks spawning upstream from the Yukon River and Tanana River confluence and assumed these fish were bound for Canada. In 2004, stock identification was based on genetic analysis and the Upper River stock group included all Yukon River stocks spawning upstream from Fort Yukon and assumed these fish were bound for Canada.

[b] Lower, Middle, and Upper stock group boundaries changed in 2004 based on genetic analysis. Commercial harvest samples collected in 2004 from Subdistricts 5-B and 5-C included Lower and Middle stock groups. Previously, fish harvested in these subdistricts were assumed to belong to the Upper stock group only. Genetic analysis is ongoing to further define stock group boundaries in the Alaskan portion of the drainage above the Yukon River and Tanana River confluence.

[c] 2005 data are not available.

Table 13.–Summary of releases for coded-wire tagged Chinook salmon from Whitehorse Hatchery, 1985–2005.

Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss	Days [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Michie	25-May-85	02-32-48	26,670	518	0.0191 [b]		27,188		0	
Michie	25-May-85	02-32-26	28,269	518	0.0180 [b]		28,787		0	
Michie	25-May-85	02-32-47	43,325	518	0.0118 [b]		43,843		0	
Wolf	1985	no-clip	0	0			0		10,520	10,520
SUM	1985		98,264	1,555			99,819		10,520	110,339
Michie	1986	02-37-31	77,170				77,170		1,000	78,170
Wolf	1986						0		5,720	5,720
SUM	1986		77,170				77,170		6,720	83,890
Michie	05-Jun-87	02-48-12	47,644	1,361	0.0278 [b]		49,005	2.50	9,598	58,603
Michie	05-Jun-87	02-48-13	49,344	808	0.0161 [b]		50,152	2.50	9,141	59,293
Michie	05-Jun-87	02-48-14	51,888	559	0.0107 [b]		52,447	2.50	9,422	61,869
Michie	05-Jun-87	02-48-15	43,367	2,066	0.0455 [b]		45,433	2.50	7,868	53,301
Michie	05-Jun-87	02-42-58	25,945	245	0.0094 [b]		26,190	2.50	4,171	30,361
Wolf	30-May-87	02-42-59	26,752	123	0.0046 [b]		26,875	2.50	422	27,297
SUM	1987		244,940	5,162			250,102		40,622	290,724
Michie	10-Jun-88	02-55-49	77,670	1,991	0.0250	15	79,661	2.80	84,903	164,564
Michie	10-Jun-88	02-555-0	78,013	1,592	0.0200	11	79,605	2.70	85,288	164,893
Wolf	05-Jun-88	no-clip	0	0			0		25,986	25,986
SUM	1988		155,683	3,583			159,266		196,177	355,443
Wolf	1989	no-clip	0	0			0		22,388	22,388
Michie	06-Jun-89	02-60-04	26,161	326	0.0123 [b]		26,487	2.30	0	26,487
Michie	06-Jun-89	02-60-05	24,951	128	0.0051 [b]		25,079	2.30	0	25,079
Michie	06-Jun-89	02-60-06	25,098	291	0.0115 [b]		25,389	2.40	0	25,389
Michie	06-Jun-89	02-60-07	25,233	156	0.0061 [b]		25,389	2.20	95,724	121,113
Fishway	06-Jun-89	02-60-08	25,194	357	0.0140 [b]		25,551	2.70	0	25,551
Fishway	06-Jun-89	02-60-09	25,190	351	0.0137 [b]		25,541	2.70	0	25,541
SUM	1989		151,827	1,609			153,436		118,112	271,548
Wolf	06-Jun-90	no-clip	0	0			0		11,969	11,969
Michie	02-Jun-90	02-02-38	24,555	501	0.0200 [b]		25,056	2.30	0	25,056
Michie	02-Jun-90	02-02-39	24,345	753	0.0300 [b]		25,098	2.30	0	25,098
Fishway	02-Jun-90	02-02-60	24,508	501	0.0200 [b]		25,009	2.20	0	25,009
Fishway	02-Jun-90	02-02-63	25,113	254	0.0100 [b]		25,367	2.20	0	25,367
SUM	1990		98,521	2,009			100,530		11,969	112,499
Wolf	08-Jun-91	18-03-22	49,477	793	0.0158 [b]		50,270	2.30	0	50,270
Fishway	06-Jun-91	18-03-23	52,948	193	0.0036 [b]		53,141	2.30	0	53,141
Michie	06-Jun-91	18-03-24	50,020	176	0.0035 [b]		50,196	2.30	87,348	137,544
SUM	1991		152,445	1,162			153,607		87,348	240,955
Wolf	04-Jun-92	18-08-29	48,239	0	0.0000 [b]		48,239	2.40	0	48,239
Fishway	04-Jun-92	18-08-28	49,356	99	0.0020 [b]		49,455	2.30	0	49,455
Michie	04-Jun-92	18-08-30	52,946	643	0.0120 [b]		53,589	2.20	249,166	302,755
SUM	1992		150,541	742			151,283		249,166	400,449
Wolf	06-Jun-93	18-12-15	50,248	0	0.0000 [b]		50,248	2.30	0	50,248
Fishway	06-Jun-93	18-12-16	49,957	434	0.0086 [b]		50,391	2.30	0	50,391
Michie	06-Jun-93	18-12-17	50,169	0	0.0000 [b]		50,169	2.30	290,647	340,816
SUM	1993		150,374	434			150,808		290,647	441,455
Wolf	02-Jun-94	18-14-27	50,155	270	0.0054 [b]		50,425	2.30	0	50,425
Michie	02-Jun-94	18-14-28	50,210	127	0.0025 [b]		50,337	2.30	158,780	209,117
Fishway	02-Jun-94	18-14-29	50,415	125	0.0025 [b]		50,540	2.30	0	50,540
SUM	1994		150,780	522			151,302		158,780	310,082
Wolf	06-Jun-95	18-12-46	10,067	164	0.0160	3	10,231	1.67	0	10,231
Wolf	06-Jun-95	18-12-47	9,122	0	0.0000	3	9,122	1.53	0	9,122
Michie	06-Jun-95	18-18-26	25,231	337	0.0132	3	25,568	2.47	4,552	30,120
Michie	06-Jun-95	18-18-27	25,187	141	0.0056	3	25,328	2.33	0	25,328
SUM	1995		69,607	642			70,249		4,552	74,801

-continued-

Table 13.–Page 2 of 3.

Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss	Days [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Wolf	26-May-96	18-07-48	10,131	102	0.0100	5	10,233	2.30	0	10,233
Fox	4-Jun-96	18-28-23	35,452	0	0.0000	5	35,452	2.43	0	35,452
Byng	4-Jun-96	18-10-41	25,263	516	0.0200	5	25,779	2.37	0	25,779
Michie	5-Jun-96	18-33-45	50,082	1,022	0.0200	5	51,104	2.51	0	51,104
Michie	5-Jun-96	18-33-46	50,260	508	0.0100	5	50,768	2.43	0	50,768
Michie	5-Jun-96	18-33-47	49,985	505	0.0100	5	50,490	2.32	0	50,490
Judas	4-Jun-96	18-33-48	49,798	1,016	0.0200	5	50,814	2.43	0	50,814
McClintock	4-Jun-96	18-33-49	49,991	302	0.0060	5	50,293	2.27	0	50,293
SUM	1996		320,962	3,971			324,933		0	324,933
Wolf	1-Jun-97	18-23-25	14,850	150	0.0100	2	15,000	2.30	0	15,000
Wolf	1-Jun-97	18-23-26	20,334	0	0.0000	4	20,334		0	20,334
Wolf	8-Jun-97	18-29-06	10,158	0	0.0000	8	10,158		0	10,158
Fox	11-Jun-97	18-25-54	25,242	0	0.0000	3	25,242	2.43	0	25,242
Fox	11-Jun-97	18-25-55	24,995	253	0.0100	3	25,248		0	25,248
Byng	11-Jun-97	18-29-07	10,029	0	0.0000	1	10,029	2.37	0	10,029
Byng	11-Jun-97	18-29-05	10,155	0	0.0000	1	10,155		0	10,155
Michie	11-Jun-97	18-28-59	49,657	502	0.0100	3	50,159	2.51	0	50,159
Michie	11-Jun-97	18-28-60	50,130	0	0.0000	3	50,130	2.43	0	50,130
Judas	7-Jun-97	18-23-27	19,951	202	0.0100	3 to 7	20,153	2.43	0	20,153
Judas	11-Jun-97	18-25-53	25,146	0	0.0000	11	25,146	2.43	0	25,146
McClintock	11-Jun-97	18-25-51	25,399	0	0.0000	3	25,399	2.27	0	25,399
McClintock	11-Jun-97	18-25-52	24,792	251	0.0100	3	25,043		0	25,043
SUM	1997		310,838	1,358			312,196		0	312,196
Michie	12-Jun-98	18-41-22	49,243	1,004	0.0200	5	50,247	2.84	0	50,247
Michie	12-Jun-98	18-41-21	49,197	1,004	0.0200	5	50,201	2.81	0	50,201
Byng	12-Jun-98	18-31-60	24,518	1,022	0.0400	5	25,540	3.00	0	25,540
McClintock	12-Jun-98	18-40-43	49,810	503	0.0100	5	50,313	2.76	0	50,313
Judas	13-Jun-98	02-54-17	19,018	1,432	0.0700	5	20,450	2.55	0	20,450
Judas	12-Jun-98	18-31-59	25,331	256	0.0100	5	25,587	2.60	0	25,587
Wolf	6-Jun-98	02-19-58	10,104	421	0.0400	5	10,525	1.95	0	10,525
Wolf	4-Jun-98	02-46-06	34,813	710	0.0200	5	35,523	2.63	0	35,523
SUM	1998		262,034	6,352			268,386		0	268,386
Michie	6-Jun-99			80,393			80,393	3.13	0	80,393
Byng	6-Jun-99			64,430			64,430	2.92	0	64,430
McClintock	6-Jun-99			64,169			64,169	2.95	0	64,169
Wolf	6-Jun-99			31,048			31,048	3.07	0	31,048
SUM	1999			240,040			240,040		0	240,040
Michie	8-Jun-00	18-31-28	25,114	254	0.0100	5	25,368	2.80	0	25,368
Michie	8-Jun-00	18-31-29	25,037	253	0.0100	5	25,290	2.80	0	25,290
Michie	8-Jun-00	18-43-03	10,907	110	0.0100	5	11,017	2.84	0	11,017
McClintock	8-Jun-00	18-13-54	25,041	254	0.0100	5	25,295	2.70	0	25,295
McClintock	8-Jun-00	18-13-55	25,016	253	0.0100	5	25,269	2.68	0	25,269
Wolf	4-Jun-00	18-23-53	25,071	253	0.0100	5	25,324	2.67	0	25,324
Wolf	4-Jun-00	18-23-54	25,012	254	0.0101	5	25,266	2.40	0	25,266
SUM	2000		161,198	1,631			162,829		0	162,829
Michie	8-Jun-01	18-44-16	25,318	256	0.0100	5	25,574	2.68	0	25,574
Michie	8-Jun-01	18-44-17	27,293	276	0.0100	5	27,569	2.68	0	27,569
Michie	8-Jun-01	18-44-18	27,337	276	0.0100	5	27,613	2.60	0	27,613
Michie	8-Jun-01	18-44-19	11,629	117	0.0100	5	11,746	2.60	0	11,746
McClintock	8-Jun-01	18-44-12	24,526	248	0.0100	5	24,774	3.13	0	24,774
McClintock	8-Jun-01	18-44-13	25,033	253	0.0100	5	25,286	3.13	0	25,286
McClintock	8-Jun-01	18-36-50	10,840	110	0.0100	5	10,950	3.13	0	10,950
Byng	8-Jun-01	18-44-14	25788	260	0.0100	5	26,048	2.84	0	26,048

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Table 13.–Page 3 of 3.

Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss	Days [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Byng	8-Jun-01	18-44-15	25,136	254	0.0100	5	25,390	2.84	0	25,390
Wolf	28-May-01	18-44-10	26,205	265	0.0100	5	26,470	3.34	0	26,470
Wolf	28-May-01	18-44-11	23,902	241	0.0100	5	24,143	3.34	0	24,143
SUM	2001		253,007	2,556			255,563		0	255,563
Wolf	23-May-02	18-51-01	25,334	126	0.0049	5	25460	3.30	0	25460
Wolf	02-Jun-02	18-51-02	25,079	177	0.0070	5	25256	3.10	0	25256
McClintock	10-Jun-02	18-51-03	24,769	505	0.0200	5	25274	3.60	0	25274
Byng	10-Jun-02	18-51-04	24,907	0	0.0000	5	24907	3.00	0	24907
Byng	10-Jun-02	18-51-05	24,925	125	0.0050	5	25050	3.00	0	25050
Michie	10-Jun-02	18-51-06	27,114	191	0.0070	5	27305	3.20	0	27305
Michie	10-Jun-02	18-51-07	26,854	0	0.0000	5	26854	3.02	0	26854
Michie	10-Jun-02	18-50-61	27,850	281	0.0100	5	28131	3.20	0	28131
Michie	10-Jun-02	18-50-62	27,241	0	0.0000	5	27241	3.04	0	27241
Michie	10-Jun-02	18-50-63	8,481	86	0.0100	5	8567	3.20	0	8567
SUM	2002		242,554	1,491			244,045		0	244,045
Wolf	25-May-03	18-47-48	27,489	83	0.0030	5	27,572	2.72	0	27,572
Wolf	25-May-03	18-47-49	26,704	161	0.0060	5	26,865	2.69	0	26,865
Byng	2-Jun-03	18-47-47	23,483	71	0.0030	5	23,554	3.01	0	23,554
Byng	2-Jun-03	18-47-46	27,058	54	0.0020	5	27,112	2.98	0	27,112
Michie	2-Jun-03	18-49-58	28,485	0	0.0000	5	28,485	3.05	0	28,485
Michie	2-Jun-03	18-49-59	27,519	0	0.0000	5	27,519	2.98	0	27,519
Michie	2-Jun-03	18-49-60	15,541	0	0.0000	5	15,541	3.07		15,541
SUM	2003		176,279	369			176,648		0	176,648
Wolf	5/28-30/2004	01-01-70	28,946	2,806		5	31,752	2.90	0	31,752
Mainstem	5/28-29/2004	02-01-69	24,920	431		5	25,351	3.10	0	25,351
Byng	8-Jun-04	02-01-68	24,401	626		5	25,027	3.36	0	25,027
McClintock	8-Jun-04	02-01-67	24,246	879		5	25,125	3.20	0	25,125
Michie	8-Jun-04	02-01-66	24,609	554		5	25,163	3.12	0	25,163
Michie	8-Jun-04	02-01-65	13,594	306		5	13,900	3.12	0	13,900
SUM	2004		140,716	5,602			146,318			146,318
Wolf	5/31-6/05	18-19-36	10,751	109	1.0000	5	10,860	2.50	0	10,860
Wolf	5/31-6/05	18-56-17	5,835	59	1.0000	5	5,894	2.50	0	5,894
Byng	13-Jun-05	18-56-18	5,853	119	2.0000	5	5,972	2.50	0	5,972
Byng	13-Jun-05	18-56-19	4,369	89	2.0000	5	4,458	2.50	0	4,458
McClintock	13-Jun-05	18-44-19	10,632	0	0.0000	5	10,632	2.50	0	10,632
Michie	13-Jun-05	02-01-64	4,870	0	0.0000	5	4,870	2.50	0	4,870
Michie	13-Jun-05	02-01-65	5,983	0	0.0000	5	5,983	2.50	0	5,983
Michie	13-Jun-05	08-01-65	28,082	284	1.0000	5	28,366	2.50	0	28,366
Michie	13-Jun-05	18-56-20	5,906	0	0.0000	5	5,906	2.50	0	5,906
Mainstem	6/02,6/14,07/7	08-01-68	28,991	293	1.0000	5	29,284	2.50	0	29,284
SUM	2005		111,272	953			112,225			112,225
TOTAL			3,479,012	281,743			3,760,755		1,174,613	4,935,368

[a] The number of days refers to the period of the the fish were held to determine tag loss.

[b] Unknown period.

[c] Usually corresponds to "tagged" category on MRP release forms. CWT Data recorded from CWT release sheets 1989-1994. CWT Data prior to 1987 not verified against SEP records.

Table 14.–Summary of releases of Chinook salmon from Yukon Territory instream incubation/rearing sites 1991-2005.

Project	Species	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	# Tagged	# ad only	# un-marked	Total Rel.	WT. (GM)
Klondike R, Nor	Chinook	1990	Tatchun R	02-01-01-02-12	Spring Fry	Tatchun R	91/06/28	91/06/28	13593	21	650	14264	0.74
Klondike R, Nor	Chinook	1990	Tatchun R	02-01-01-02-09	Spring Fry	Tatchun R	91/06/28	91/06/28	15247	173	750	16170	0.74
Klondike R, Nor	Chinook	1991	Tatchun R	18-06-45	Spring Fry	Tatchun R	/ /	92/08/31	11734	0	817	12551	2.47
Klondike R, Nor	Chinook	1991	Tatchun R	02-33-56	Spring Fry	Tatchun R	/ /	92/08/31	6453	0	852	7305	2.47
Klondike R, Nor	Chinook	1991	Tatchun R	18-06-44	Spring Fry	Tatchun R	/ /	92/08/31	11585	0	320	11905	2.47
Klondike R, Nor	Chinook	1991	Yukon R	NOCN9148	Spring Fry	Pothole Lk	92/06/	92/06/	0	0	1500	1500	0
Klondike R, Nor	Chinook	1993	Klondike R Nor	02-01-01-05-03	Spring Fry	Klondike R Nor	94/06/30	94/06/30	6174	10	54	6238	0.88
Klondike R, Nor	Chinook	1993	Tatchun R	02-01-01-04-07	Spring Fry	Tatchun R	94/06/30	94/06/30	12077	246	71	12394	0.99
Klondike R, Nor	Chinook	1993	Tatchun R	02-01-01-05-05	Spring Fry	Tatchun R	94/06/30	94/06/30	9982	0	61	10043	0.99
Klondike R, Nor	Chinook	1994	Klondike R Nor	02-01-01-06-03	Spring Fry	Klondike R Nor	95/07/04	95/07/04	2159	11	190	2360	0.75
Klondike R, Nor	Chinook	1994	Klondike R Nor	02-01-01-06-02	Spring Fry	Klondike R Nor	95/07/04	95/07/04	1809	16	56	1881	0.75
Klondike R, Nor	Chinook	1994	Tatchun R	02-01-01-05-11	Spring Fry	Tatchun R	95/07/04	95/07/04	12431	100	686	13217	0.81
Klondike R, Nor	Chinook	1994	Tatchun R	02-01-01-05-15	Spring Fry	Tatchun R	95/07/04	95/07/04	2490	33	177	2700	0.81
Klondike R, Nor	Chinook	1994	Tatchun R	02-01-01-06-01	Spring Fry	Tatchun R	95/07/04	95/07/04	1476	19	155	1650	0.81
Klondike R, Nor	Chinook	1994	Tatchun R	02-01-01-05-13	Spring Fry	Tatchun R	95/07/04	95/07/04	11649	238	413	12300	0.81
Klondike R, Nor	Chinook	1995	Klondike R Nor	02-01-01-04-08	Spring Fry	Klondike R Nor	96/06/22	96/06/22	11423	1707	0	13130	0.76
Mayo River	Chinook	1991	Mayo R	NOCN9147	Spring Fry	Mayo R	92/06/	92/06/	0	0	13000	13000	0
Mayo River	Chinook	1992	Mayo R	NOCN9292	Spring Fry	Mayo R	93/07/	93/07/	0	0	500	500	0
McIntyre Cr	Chinook	1990	Takhini R	02-33-55	Fall Fry 5-8 gm	Takhini R	91/09/13	91/09/13	7967	80	39	8086	3.2
McIntyre Cr	Chinook	1990	Takhini R	02-33-54	Fall Fry 5-8 gm	Takhini R	91/09/13	91/09/13	10789	109	101	10999	3.2

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Table 14.–Page 2 of 2.

Project	Species	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	# Tagged	# ad only	# un-marked	Total Rel.	WT. (GM)
McIntyre Cr	Chinook	1991	Takhini R	02-01-01-03-08	Spring Fry	Flat Cr	/ /	92/07/04	12141	143	3425	15709	0.98
McIntyre Cr	Chinook	1991	Takhini R	02-01-01-03-09	Spring Fry	Flat Cr	/ /	92/07/04	13102	466	1398	14966	0.98
McIntyre Cr	Chinook	1991	Takhini R	02-01-01-03-10	Spring Fry	Flat Cr	/ /	92/07/04	4955	261	601	5817	0.98
McIntyre Cr	Chinook	1992	Klondike R Nor	02-01-01-04-04	Spring Fry	Klondike R Nor	93/07/01	93/07/01	12832	240	144	13216	1.14
McIntyre Cr	Chinook	1992	Klondike R Nor	02-01-01-04-05	Spring Fry	Klondike R Nor	93/07/01	93/07/01	7546	256	167	7969	1.14
McIntyre Cr	Chinook	1992	Takhini R	02-34-24	Spring Fry	Flat Cr	93/08/17	93/08/17	9532	823	95	10450	2.71
McIntyre Cr	Chinook	1992	Takhini R	02-34-23	Spring Fry	Flat Cr	93/08/17	93/08/17	9822	850	218	10890	2.71
McIntyre Cr	Chinook	1992	Takhini R	18-14-54	Spring Fry	Flat Cr	93/08/17	93/08/17	10925	567	227	11719	2.71
McIntyre Cr	Chinook	1992	Takhini R	18-14-53	Spring Fry	Flat Cr	93/08/17	93/08/17	10658	865	226	11749	2.71
McIntyre Cr	Chinook	1992	Takhini R	02-02-17	Spring Fry	Flat Cr	93/08/17	93/08/17	2291	114	37	2442	2.71
McIntyre Cr	Chinook	1992	Takhini R	02-34-22	Spring Fry	Flat Cr	93/08/17	93/08/17	10355	314	40	10709	2.71
McIntyre Cr	Chinook	1992	Tatchun R	02-01-01-04-02	Spring Fry	Tatchun R	93/06/17	93/06/17	4654	633	335	5622	0.76
McIntyre Cr	Chinook	1993	Takhini R	18-17-51	Spring Fry	Flat Cr	94/08/26	94/08/31	7410	46	222	7678	2.6
McIntyre Cr	Chinook	1993	Takhini R	18-17-50	Spring Fry	Flat Cr	94/08/26	94/08/31	11227	40	87	11354	2.6
McIntyre Cr	Chinook	1993	Takhini R	18-17-49	Spring Fry	Flat Cr	94/08/26	94/08/31	11071	159	142	11372	2.6
McIntyre Cr	Chinook	1993	Takhini R	18-17-48	Spring Fry	Flat Cr	94/08/26	94/08/31	11375	0	104	11479	2.6
McIntyre Cr	Chinook	1993	Takhini R	18-17-52	Spring Fry	Flat Cr	94/08/26	94/08/31	10668	21	198	10887	2.6
McIntyre Cr	Chinook	1993	Takhini R	02-02-16	Spring Fry	Takhini R	94/08/30	94/08/30	9343	271	36	9650	2.8
McIntyre Cr	Chinook	1993	Takhini R	02-01-63	Spring Fry	Takhini R	94/08/30	94/08/30	10899	222	62	11183	2.8
McIntyre Cr	Chinook	1994	Takhini R	02-01-01-04-15	Spring Fry	Takhini R	95/08/14	95/08/14	9887	0	410	10297	2.2
McIntyre Cr	Chinook	1994	Takhini R	02-01-01-04-13	Spring Fry	Takhini R	95/08/14	95/08/14	14452	0	365	14817	2.2
McIntyre Cr	Chinook	1994	Takhini R	02-01-01-04-12	Spring Fry	Flat Cr	95/08/14	95/08/14	14193	59	281	14533	2.2
McIntyre Cr	Chinook	1994	Takhini R	02-01-01-04-14	Spring Fry	Flat Cr	95/08/14	95/08/14	13586	130	295	14011	2.2
McIntyre Cr	Chinook	1995	Takhini R	02-01-01-05-08	Spring Fry	Takhini R	96/08/12	96/08/12	15731	251	496	16478	2.1
McIntyre Cr	Chinook	1995	Takhini R	02-01-01-05-09	Spring Fry	Takhini R	96/08/12	96/08/12	8085	41	293	8419	2.1
McIntyre Cr	Chinook	1995	Takhini R	02-01-01-05-10	Spring Fry	Flat Cr	96/08/07	96/08/07	10727	65	170	10962	2.01
McIntyre Cr	Chinook	1995	Tatchun R	02-01-01-02-10	Spring Fry	Tatchun R	96/06/27	96/06/27	14530	49	62	14641	0.81
McIntyre Cr	Chinook	1995	Tatchun R	02-01-01-02-11	Spring Fry	Tatchun R	96/06/27	96/06/27	13526	91	294	13911	0.81

Table 15.–Yukon River fall chum salmon estimated brood year production and return per spawner estimates 1974-2005.

				Estimated Brood Year Return								(R)	
	(P)	Estimated Annual Totals		Number of Salmon [a]				Percent				Total Brood Year	(R/P) Return/
Year	Escapement	Catch	Return	Age 3	Age 4	Age 5	Age 6	Age 3	Age 4	Age 5	Age 6	Return[a]	Spawner
1974	437,485	478,875	916,360	91,751	497,755	68,693	0	0.139	0.756	0.104	0.000	658,199	1.50
1975	1,465,213	473,062	1,938,275	150,451	1,225,440	61,227	123	0.105	0.853	0.043	0.000	1,437,241	0.98
1976	268,841	339,043	607,884	102,062	585,820	136,358	4,313	0.123	0.707	0.165	0.005	828,553	3.08
1977	514,843	447,918	962,761	102,370	1,069,856	175,578	4,186	0.076	0.791	0.130	0.003	1,351,992	2.63
1978	320,487	434,030	754,517	22,112	332,023	90,532	0	0.050	0.747	0.204	0.000	444,667	1.39
1979	780,818	615,377	1,396,195	41,088	769,082	274,310	3,894	0.038	0.707	0.252	0.004	1,088,374	1.39
1980	261,113	488,305	749,418	8,373	362,199	208,962	3,125	0.014	0.622	0.359	0.005	582,658	2.23
1981	551,192	677,257	1,228,449	45,855	955,725	278,386	8,888	0.036	0.742	0.216	0.007	1,288,853	2.34
1982	179,828	373,175	553,003	11,327	400,323	166,754	678	0.020	0.691	0.288	0.001	579,083	3.22
1983	347,157	525,016	872,173	12,569	875,355	223,322	2,304	0.011	0.786	0.201	0.002	1,113,550	3.21
1984	270,042	412,322	682,364	7,089	407,774	173,546	8,493	0.012	0.683	0.291	0.014	596,902	2.21
1985	664,426	515,481	1,179,907	46,605	871,500	270,268	3,194	0.039	0.731	0.227	0.003	1,191,566	1.79
1986	376,374	318,028	694,402	0	428,614	368,513	4,353	0.000	0.535	0.460	0.005	801,479	2.13
1987	651,943	406,143	1,058,086	12,380	617,519	290,767	7,720	0.013	0.665	0.313	0.008	928,386	1.42
1988	325,137	353,242	678,379	41,003	175,236	152,368	10,894 b	0.108	0.462	0.401	0.029	379,501	1.17
1989	506,173	541,177	1,047,350	2,744	282,905	345,136 b	20,290	0.004	0.435	0.530	0.031	651,075	1.29
1990	369,654	350,100	719,754	710	579,452 b	418,448	30,449	0.001	0.563	0.407	0.030	1,029,059	2.78
1991	591,132	439,096	1,030,228	3,663 b	1,024,800	369,103	12,167	0.003	0.727	0.262	0.009	1,409,733	2.38
1992	324,253	148,846	473,099	6,763	653,648	197,073	3,907	0.008	0.759	0.229	0.005	861,392	2.66
1993	352,688	91,015	443,703	7,745	451,327	102,404	3,260	0.014	0.799	0.181	0.006	564,736	1.60
1994	769,920	169,225	939,145	4,322	225,209	150,674	1,614 b	0.011	0.590	0.395		381,820	0.50
1995	1,009,155	461,147	1,470,302	2,371	269,004	69,385 b	383	0.007	0.789	0.203	0.001	341,141	0.34
1996	800,022	260,923	1,060,945	423	166,812 b	136,845	8,041	0.001	0.534	0.438	0.026	312,122	0.39
1997	494,831	170,059	664,890	3,108 b	244,692	114,714	3,285	0.008	0.669	0.314	0.009	365,798	0.74
1998	263,121	70,770	333,891	650	261,384	57,135	6,356	0.002	0.803	0.176	0.020	325,525	1.24
1999	292,315	131,046	423,361	28,204	695,093	165,599	12,550	0.031	0.771	0.184	0.014	901,446	3.08
2000	212,376	28,543	240,919	8,326	281,985	105,626	**1,090**	0.021	0.710	0.266		397,027 d	>1.87
2001	337,904	44,666	382,570	129,156	1,973,433	**614,546**						2,717,134 g	>8.04
2002	384,932	27,411	412,343	0									
2003	684,310	79,529	763,839										
2004	506,860	76,235	583,095										
2005	1,804,753	286,856	2,091,609										
Average-04	494,018	320,873	814,891										
	507,237	**All Brood Years (1974-1999)**		29,067	554,944	194,850	6,326	0.0336	0.6891	0.2681	0.0094	785,187	1.83
	382,021	Even Brood Years (1974-1999)		22,814	390,481	178,915	5,839	0.0376	0.6501	0.3012	0.0116	598,535	1.88
	632,453	Odd Brood Years (1974-1999)		35,319	719,408	210,785	6,326	0.0296	0.7280	0.2350	0.0074	971,838	1.78
	512,698	**All Brood Years (1974-1983)**		58,796	707,358	168,412	2,751	0.0611	0.7401	0.1960	0.0027	937,317	2.20
	293,551	Even Brood Years (1974-1983)		47,125	435,624	134,260	1,623	0.0692	0.7046	0.2238	0.0023	618,632	2.29
	731,845	Odd Brood Years (1974-1983)		70,467	979,092	202,565	3,879	0.0530	0.7756	0.1682	0.0031	1,256,002	2.11
	517,925	**All Brood Years (1984-1999)**		10,486	459,686	211,374	8,560	0.0164	0.6572	0.3131	0.0139	690,105	1.61
	437,315	Even Brood Years (1984-1999)		7,620	362,266	206,825	9,263	0.0179	0.6161	0.3495	0.0183	585,975	1.63
	570,333	Odd Brood Years (1984-1999)		13,352	557,105	215,922	7,856	0.0150	0.6982	0.2767	0.0101	794,235	1.58

[a] The estimated number of salmon which returned are based upon annual age composition observed in lower Yukon test nets each year, weighted by test fish CPUE.

[b] Based upon expanded test fish age composition estimates for years in which the test fishery terminated early both in 1994 and 2000 (see footnote "b" Table 5).

[d] Brood year return for 3, 4, and 5 year fish, indicate that production (R/P) from brood year 2000 was at least 1.87. Recruits estimated for incomplete brood year.

[g] Brood year return for 3 and 4 year fish, indicate that production (R/P) from brood year 2001 was at least 8.04. Recruits estimated for incomplete brood year.

Table 16.–Commercial harvest of sockeye and chum salmon in the False Pass June Fishery, 1980–2005[a].

Year	Sockeye	Chum
1980	3,206,000	509,000
1981	1,821,000	564,000
1982	2,119,000	1,095,000
1983	1,964,000	786,000
1984	1,388,000	337,000
1985	1,791,000	434,000
1986	471,000	352,000
1987	794,000	443,000
1988	757,000	527,000
1989	1,745,000	455,000
1990	1,346,000	519,000
1991	1,549,000	773,000
1992	2,458,000	426,000
1993	2,974,000	532,000
1994	1,461,000	582,000
1995	2,105,000	537,000
1996	1,029,000	360,000
1997	1,628,000	322,000
1998	1,288,000	246,000
1999	1,375,000	245,000
2000	1,251,228	239,357
2001	150,632	48,350
2002	591,106	177,606
2003	524,709	357,043
2004	1,347,000	482,000
2005	1,004,000	428,000
avg 84-04	1,334,461	399,731
avg 02-04	820,938	338,883

[a] Source of data: Charles Burkey, ADF&G.

Table 17.–Exvessel value of the catch in the commercial fisheries off Alaska by species group, 1982-2505, (value in $ millions).

109 [a]	Shellfish	Salmon	Herring	Halibut	Groundfish	Total
1982	216.5	310.7	19.9	25.7	211	783.80
1983	147.7	320.6	29.8	43	188	729.10
1984	103.4	343	20.4	19.6	239.4	725.80
1985	106.9	389.6	36.9	37.5	260.1	831.00
1986	183	404.1	38.4	70.1	268.6	964.20
1987	215.2	473	41.7	76.3	336.7	1,142.90
1988	235.6	744.9	56	66.1	444.6	1,547.10
1989	279.2	506.7	18.7	84.4	425.3	1,314.30
1990	355.1	546.7	24	86.9	474.9	1,487.60
1991	301.1	300.1	28.6	91.6	548.3	1,269.70
1992	335.1	544.5	27	48	656.9	1,611.50
1993	328.5	391.1	14.1	53.6	425.8	1,213.10
1994	321.2	424.4	21.6	84.7	465.2	1,317.10
1995	282.9	495.9	39.1	59.5	593.7	1,471.10
1996	175.2	346.5	44.8	74.2	541.9	1,182.60
1997	172.1	247.8	15.9	106.5	597.7	1,141.00
1998	218.7	242.7	10.8	94.1	415.5	981.80
1999	271.2	345.7	14.2	116.9	483.4	1,231.40
2000	132.6	275.1	14	145	369	935.7
2001	128.6	229.1	14	132	632	1135.7
2002	150.7	162.5	12	129	553	1007.2
2003	181.6	209.6	12	171	560	1134.2
2004	169.5	272.2	15.3	174.6	564.7	1196.3
2005	147.8	302.7	15.4	169.4	660.5	1295.8
			Percentage of Total			
1982	27.6	39.6	2.5	3.3	26.9	100
1983	20.3	44	4.1	5.9	25.8	100
1984	14.2	47.3	2.8	2.7	33	100
1985	12.9	46.9	4.4	4.5	31.3	100
1986	19	41.9	4	7.3	27.9	100
1987	18.8	41.4	3.6	6.7	29.5	100
1988	15.2	48.2	3.6	4.3	28.7	100
1989	21.2	38.6	1.4	6.4	32.4	100
1990	23.9	36.8	1.6	5.8	31.9	100
1991	23.7	23.6	2.3	7.2	43.2	100
1992	20.8	33.8	1.7	3	40.7	100
1993	27.1	32.2	1.2	4.4	35.1	100
1994	24.4	32.2	1.7	6.4	35.3	100
1995	19.2	33.7	2.7	4		100
1996	14.8	29.4	3.8	6.3		100
1997	15.3	22.0	1.4	9.5	51.8	100
	22.3	24.7	1.1	9.6	42.3	100
1999	22	28.1	1.2	9.5	39.3	100
2000	14.2	29.4	1.5	15.5	39.4	100
2001	11.3	20.2	1.2	11.6	55.6	100
2002	15	16.1	1.2	12.8	54.9	100
2003	16	18.5	1.1	15.1	49.4	100
2004	14.2	22.8	1.3	14.6	47.2	100
2005	11.4	23.4	1.2	13.1	51	100

[a] Data for years 2000-2003 are unavailable at this time.

Note: The value added by at-sea processing is not included in these estimates of exvessel value. Includes Joint venture and foreign groundfish catch.

Source: National Marine Fisheries Service, Alaska Region; National Marine Fisheries Service Office of the Pacific Marine Fisheries Commission, Pacific Fisheries Information Network, 7600 Sand Point Way N.E., BIN C15700, Seattle, WA 98115-0070.

Table 18.–Total groundfish catch and estimated number of Chinook and other salmon caught by the groundfish fisheries off the coast of Alaska, 1990 through 2005.

Year	Groundfish (mt)	Chinook	Chum	Coho	Sockeye	Pink	Total
BSAI							
1990	1,706,379	14,085	16,202	153	30	31	30,501
1991	2,154,903	48,873	29,706	396	79	79	79,133
1992	2,057,849	41,955	40,090	1,266	14	80	83,405
1993	1,854,216	45,964	242,895	321	22	8	289,210
1994	1,958,788	44,380	95,978	231	20	202	140,811
1995	1,928,073	23,079	20,901	858	0	21	44,859
1996	1,847,631	63,205	77,771	218	5	1	141,200
1997	1,824,188	50,218	67,349	114	3	69	117,753
1998	1,615,685	55,427	----------65,631----------				121,058
1999	1,424,752	12,924	----------46,295----------				59,219
2000	1,607,549	7,470	----------57,600----------				65,070
2001	1,813,924	37,734	----------57,339----------				95,073
2002	1,934,957	37,605	----------78,454----------				116,059
2003	1,970,817	54,763	----------193,981----------				248,744
2004	1,978,721	62,459	----------447,196----------				509,655
2005	1,407,925	74,843	----------701,741----------				776,584
GOA							
1990	244,397	16,913	2,541	1,482	85	64	21,085
1991	269,616	38,894	13,713	1,129	51	57	53,844
1992	269,797	20,462	17,727	86	33	0	38,308
1993	255434	24,465	55,268	306	15	799	80,853
1994	239,503	13,973	40,033	46	103	331	54,486
1995	216,585	14,647	64,067	668	41	16	79,439
1996	202,054	15,761	3,969	194	2	11	19,937
1997	230,448	15,119	3,349	41	7	23	18,539
1998	245,516	16,984	----------13,544----------				30,528
1999	227,614	30,600	---------- 7,530----------				38,130
2000	204,398	26,705	---------- 10,995----------				37,700
2001	182,011	15,104	---------- 6,063----------				21,167
2002	165,664	12,759	----------3,192----------				15,951
2003	176,433	15,877	----------10,599----------				26,475
2004	168,475	17,832	----------5,893----------				23,725
2005	133,171	31,896	----------6,841----------				38,737

Source: Berger 2002 and NMFS Alaska Region Catch Accounting.

Table 19.–Coded-wire tagged Yukon River Chinook salmon recoveries in the US groundfish fisheries.

Brood Year	Location	Release Date	Recovery Date	Latitude	Longitude	Gear Type
1995	Mitchie Cr.	6/11/1997	3/16/2000	55° 56’	168° 52’	Domestic Trawl
1997	Judas Cr.	6/12/1998	3/28/2001	56° 18’	170° 33’	Domestic Trawl
2000	McClintock R.	6/8/2001	2/15/2002	56° 10’	166° 00’	Domestic Trawl
2001	Mitchie Cr.	6/10/2002	10/3/2002	64° 06’	164° 31’	Research Trawl
2001	Wolf Cr.	6/2/2002	10/3/2002	64° 06	164° 31’	Research Trawl
2001	Mitchie Cr.	6/10/2002	10/4/2002	63° 00’	165° 58’	Research Trawl
2001	Mitchie Cr.	6/10/2002	2/8/2003	56° 44’	167° 00’	Domestic Trawl
1988	Mitchie Cr.	6/6/1989	3/25/1992	56° 44’	173° 15’	Domestic Trawl
1990	Wolf Cr.	8/8/1991	3/14/1994	60° 06’	178° 58’	Domestic Trawl
1992	Wolf Cr.	6/6/1993	12/6/1994	56° 52’	171° 18’	Domestic Trawl
1991	Mitchie Cr.	6/4/1992	2/24/1995	55° 19’	164° 43’	Domestic Trawl
1992	Yukon R.	6/15/1993	6/2/1997	59° 29’	167° 49’	Domestic Trawl
1993	Mitchie Cr.	6/1/1994	3/10/1998	59° 26’	178° 05’	Domestic Trawl
1995	Fox Cr.	6/4/1996	3/29/1998	58° 56’	178° 06’	Domestic Trawl
1995	Judas Cr.	6/4/1996	3/30/1999	57° 43’	173° 34’	Domestic Trawl
1999	Wolf Creek	6/10/2000	3/3/2003	56° 26’	169° 55’	Domestic Trawl
1988	McClintock R.	6/6/1989	3/19/2004	Area 513		Domestic Trawl
2001	Mitchie Cr.	6/10/2002	3/15/2005	57° 21’	171° 39’	Domestic Trawl
2001	Wolf Cr.	5/23/2002	10/8/2004	54° 01’	166° 29’	Domestic Trawl

FIGURES

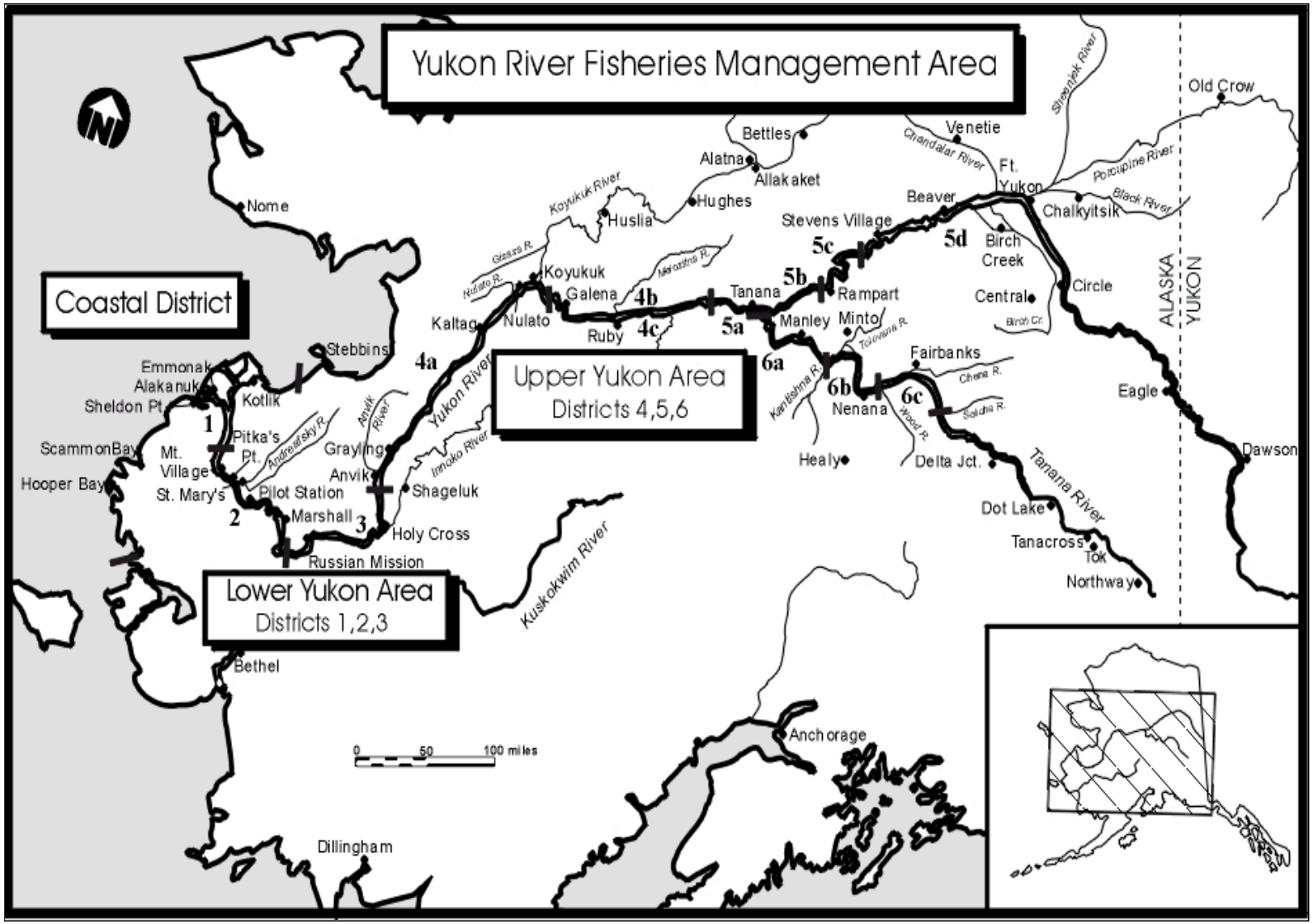
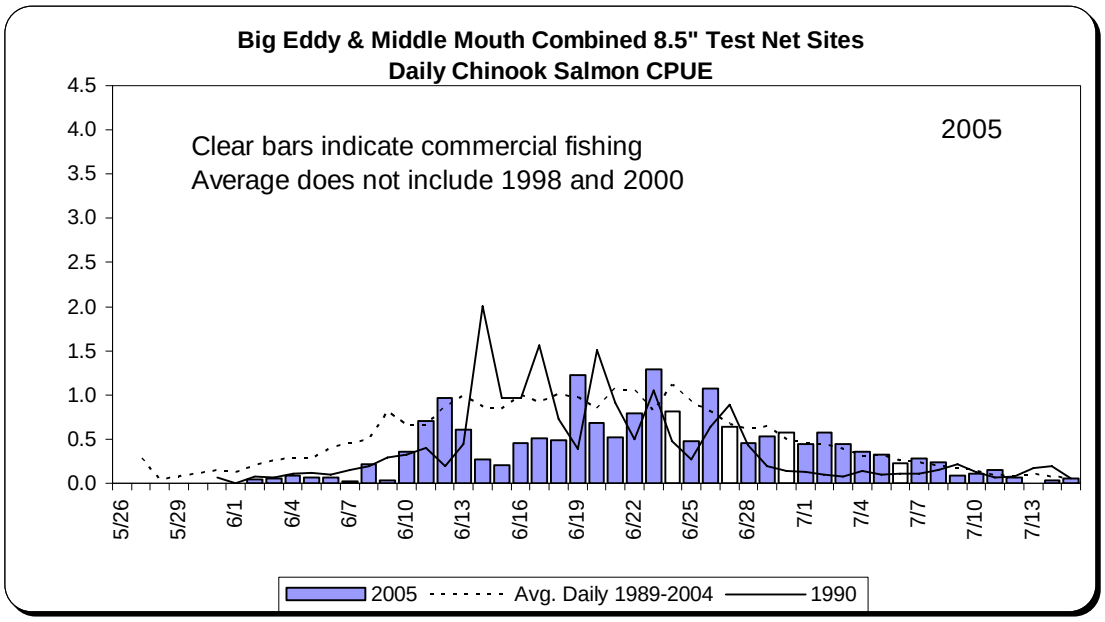
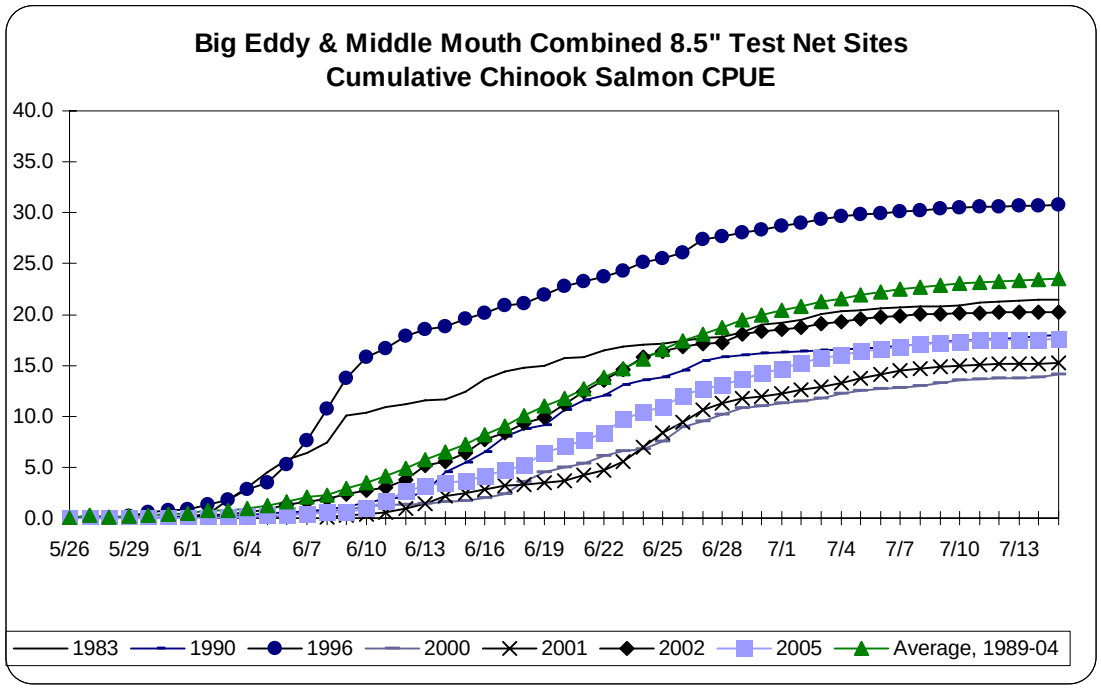


Figure 1.–Alaska portion of the Yukon River drainage showing communities and fishing districts.





Note: Average is without 1998 and 2000.

Figure 2.–Daily test fish CPUE for Chinook salmon test fish sites (top). 2005 Cumulative test fish CPUE for Chinook salmon test fish sites (bottom) compared to the 1989-2004 average CPUE.

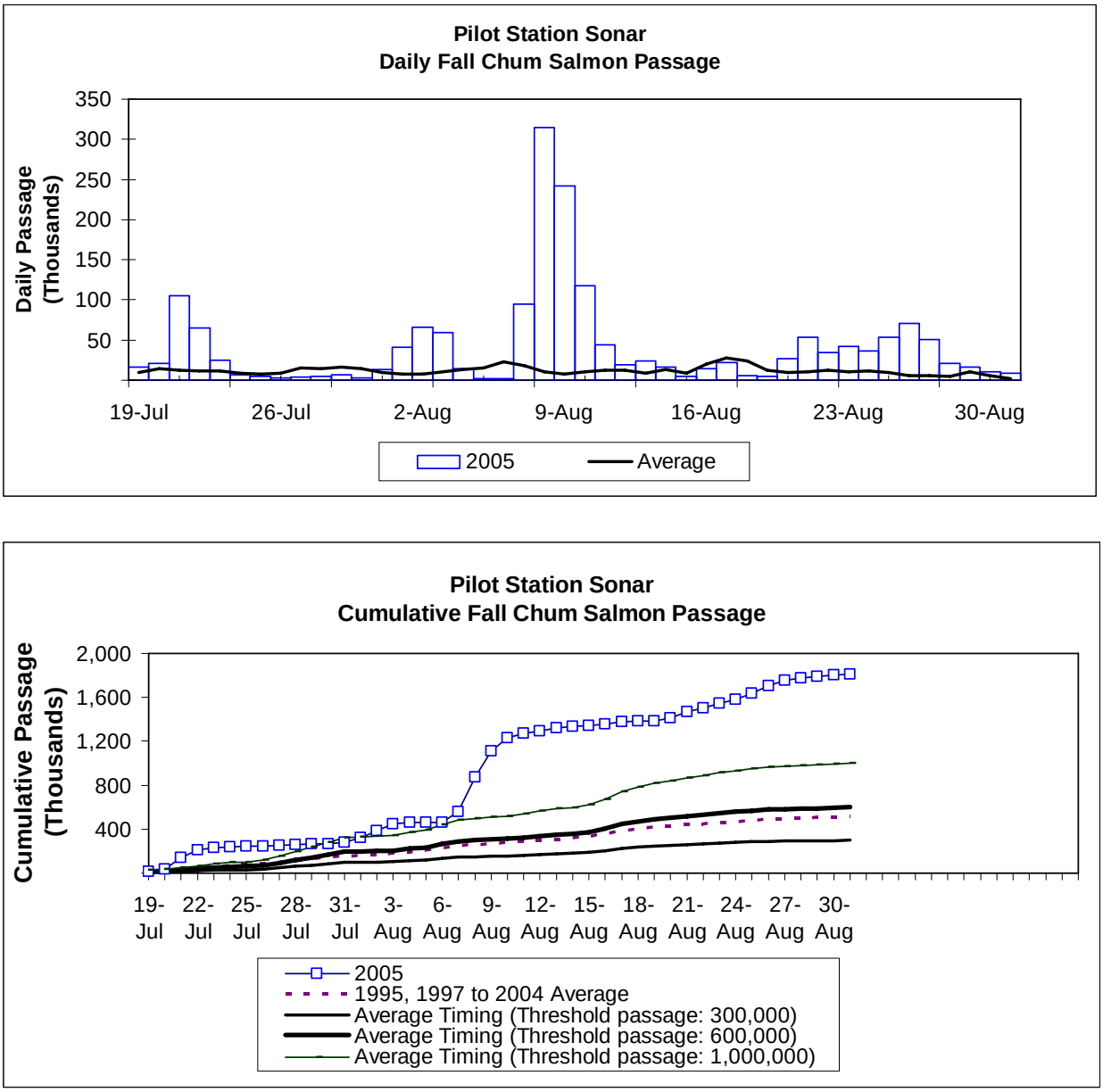
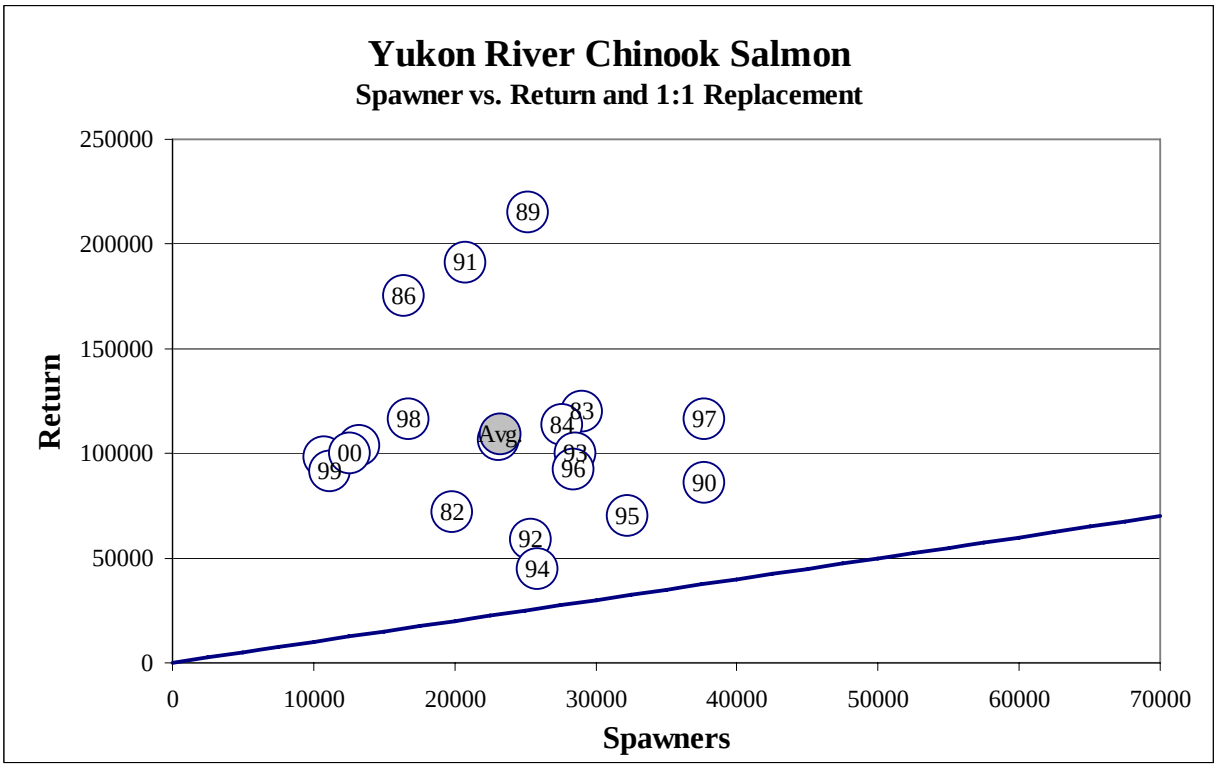


Figure 3.–Daily Pilot Station sonar passage counts attributed to fall chum salmon in 2005 (top figure), compared to 1995 and 1997 through 2004 average. Cumulative Pilot Station sonar passage counts attributed to fall chum salmon in 2005 (bottom figure), compared to 1995 and 1997 though 2004 average.



Note: years in the figure represent the brood years.

Figure 4.–Yukon River mainstem Canadian Chinook salmon spawners versus estimated returns and the 1:1 replacement line.

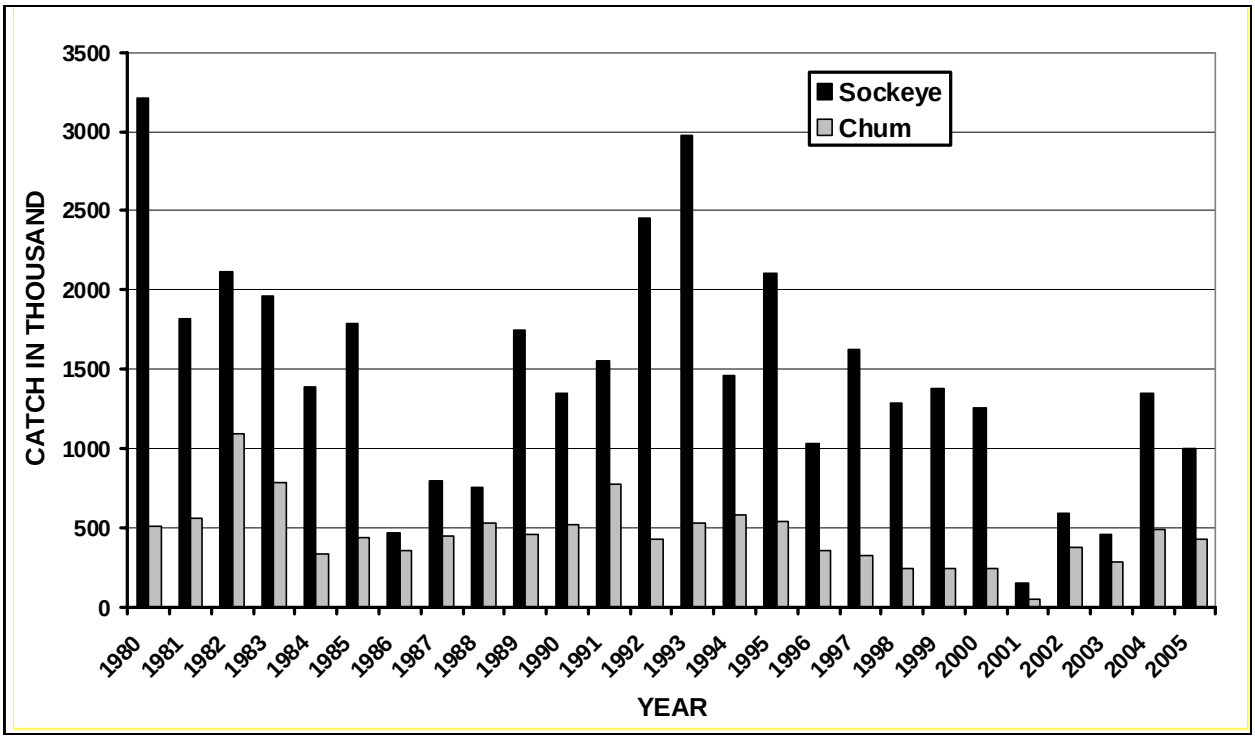


Figure 5.–Sockeye and chum salmon catch in the South Peninsula June fishery, 1980-2005.

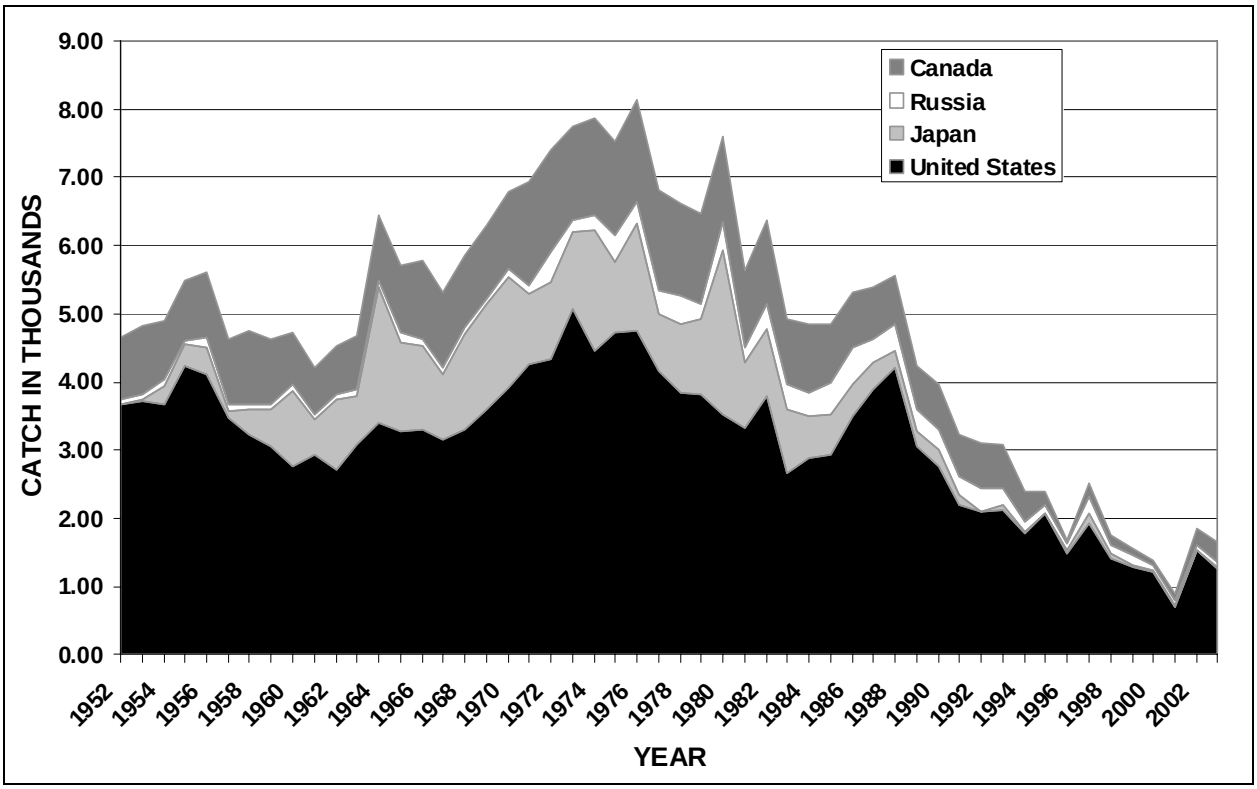


Figure 6.–World Chinook salmon catch, 1952-2003.

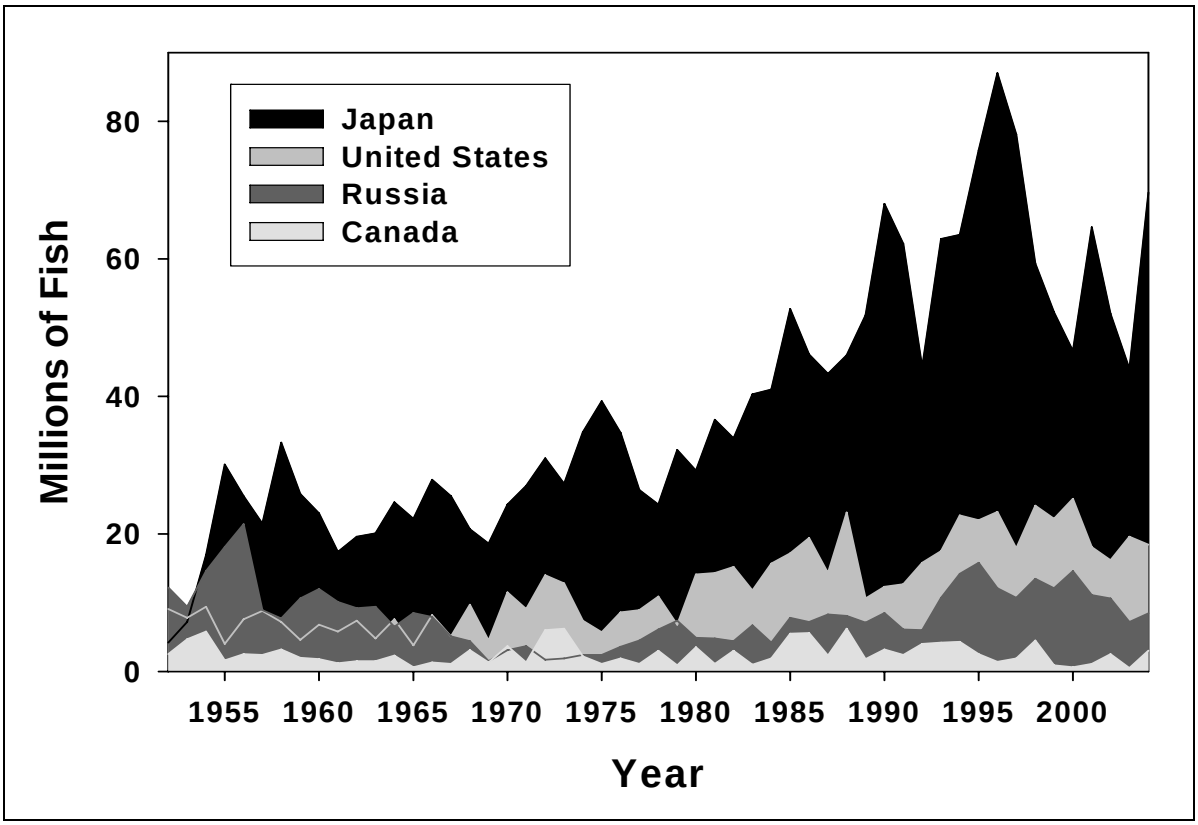


Figure 7.–World chum salmon catch - 1952-2004.

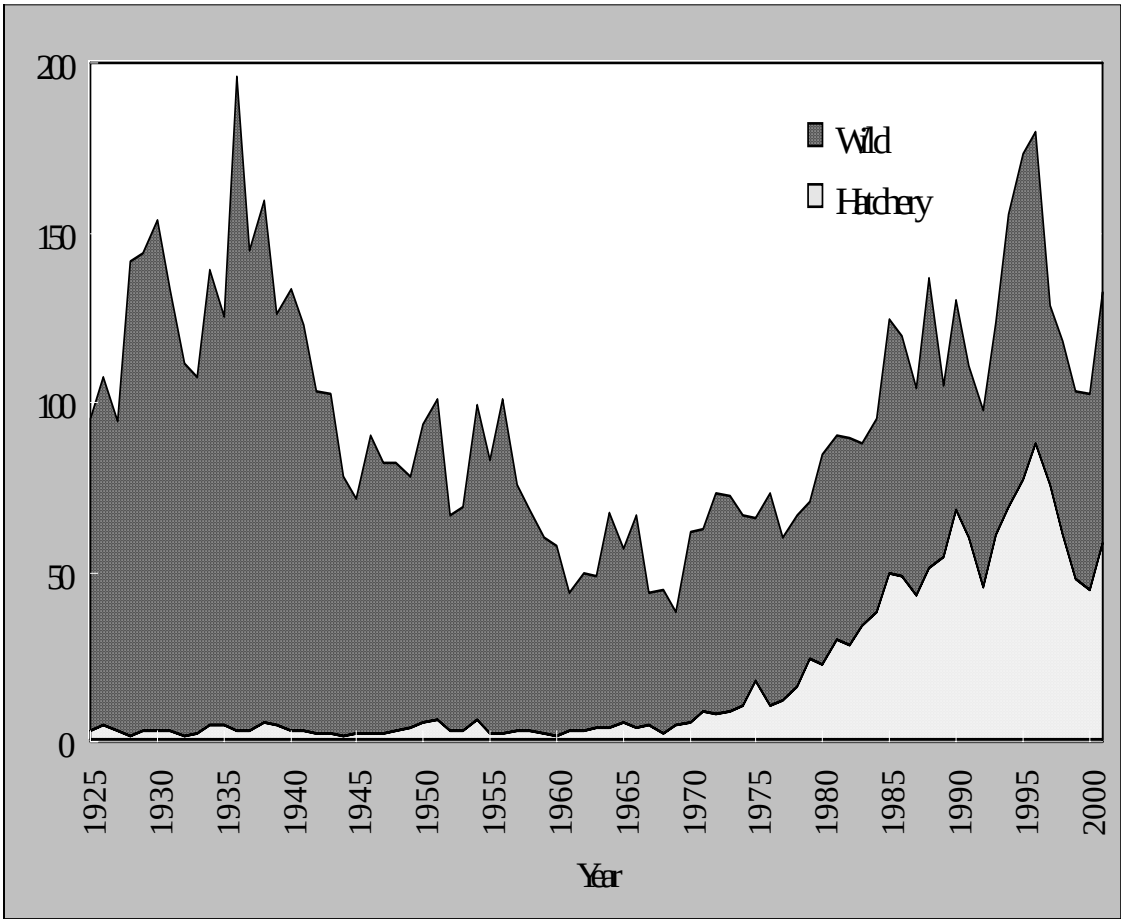


Figure 8.–Number of wild and hatchery chum salmon in the North Pacific Ocean 1925-2002 (Kaeriyama, 2003).

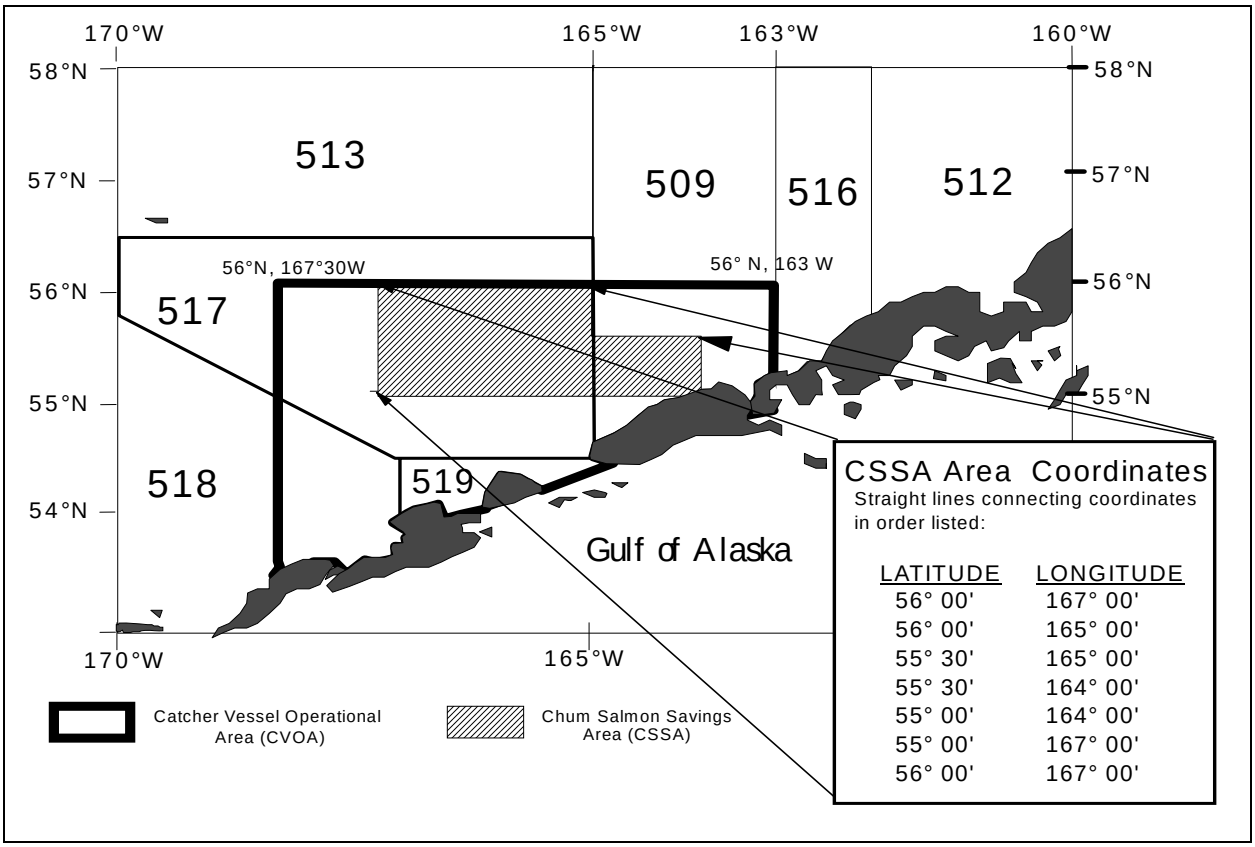


Figure 9.–Statistical reporting areas and chum salmon savings area for the U. S. groundfish fisheries in the Bering Sea.

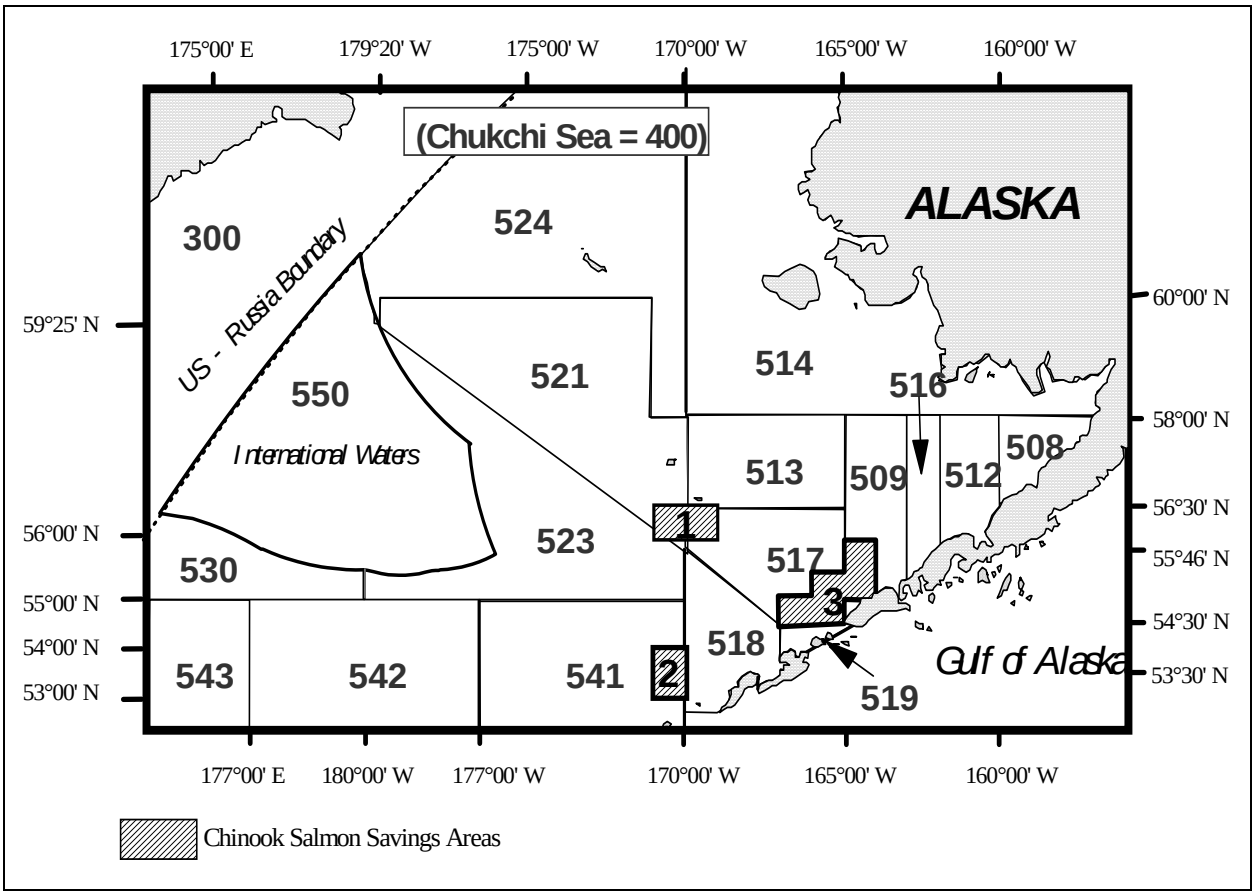


Figure 10.–Statistical reporting areas and chinook salmon saving areas for the U. S. groundfish fisheries in the Bering Sea.

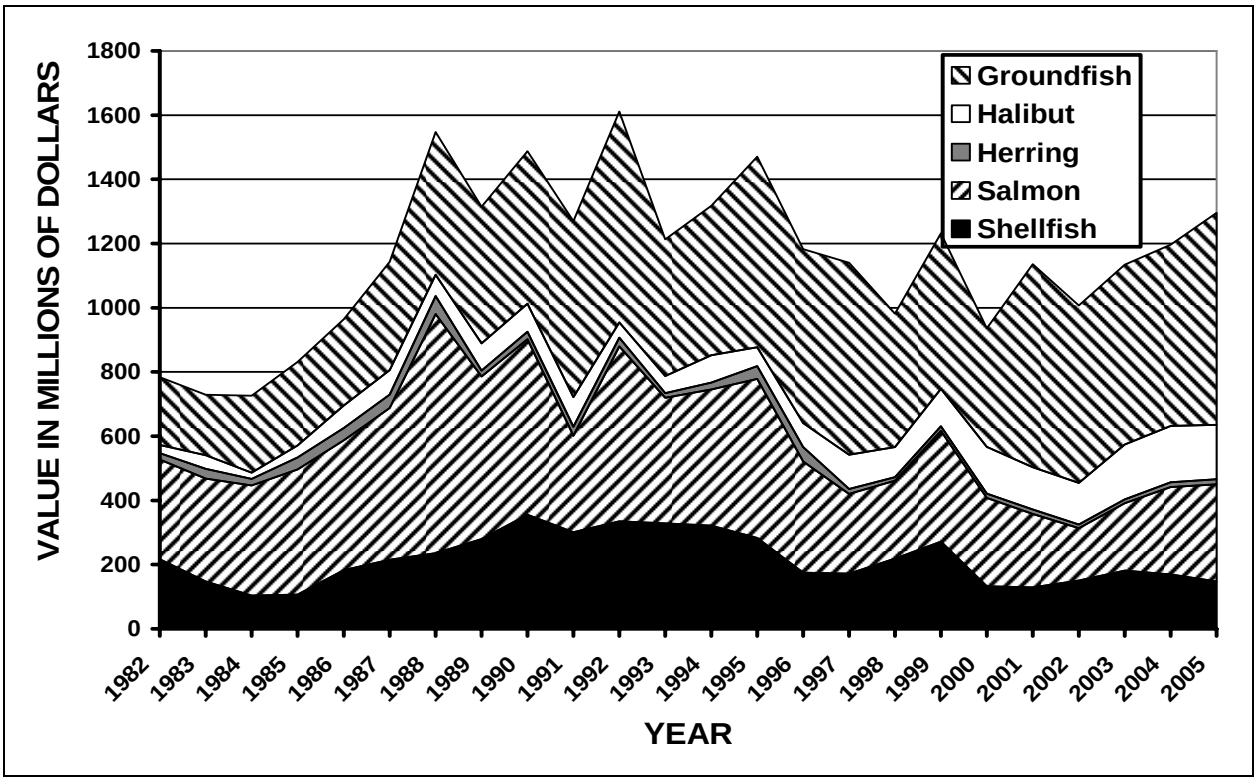


Figure 11.–Exvessel value of the catch in the commercial fisheries off Alaska by species in millions, 1982-2005.

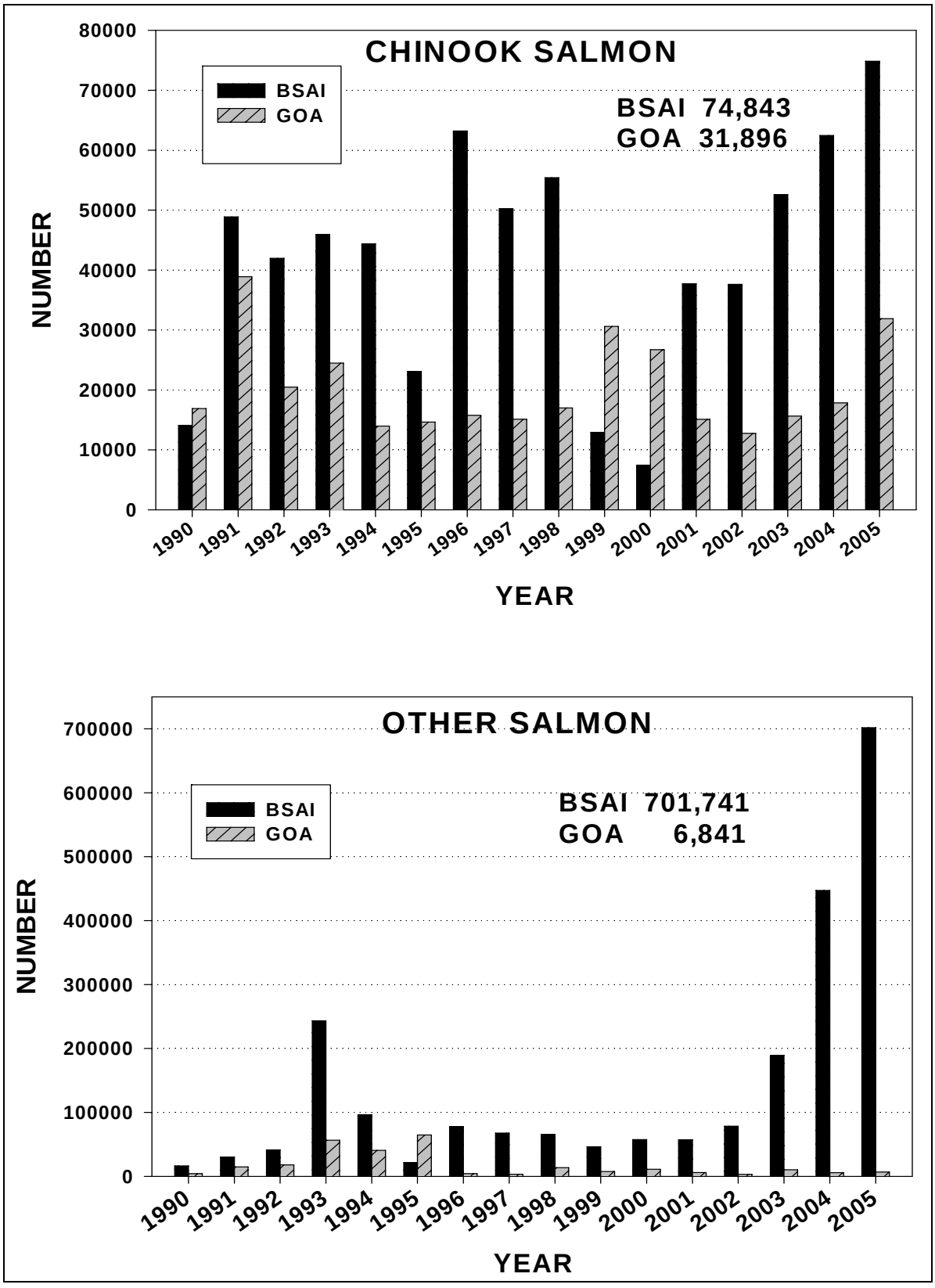


Figure 12.–Salmon bycatch in the Gulf of Alaska and Bering Sea Groundfish fishery, 1990-2005.

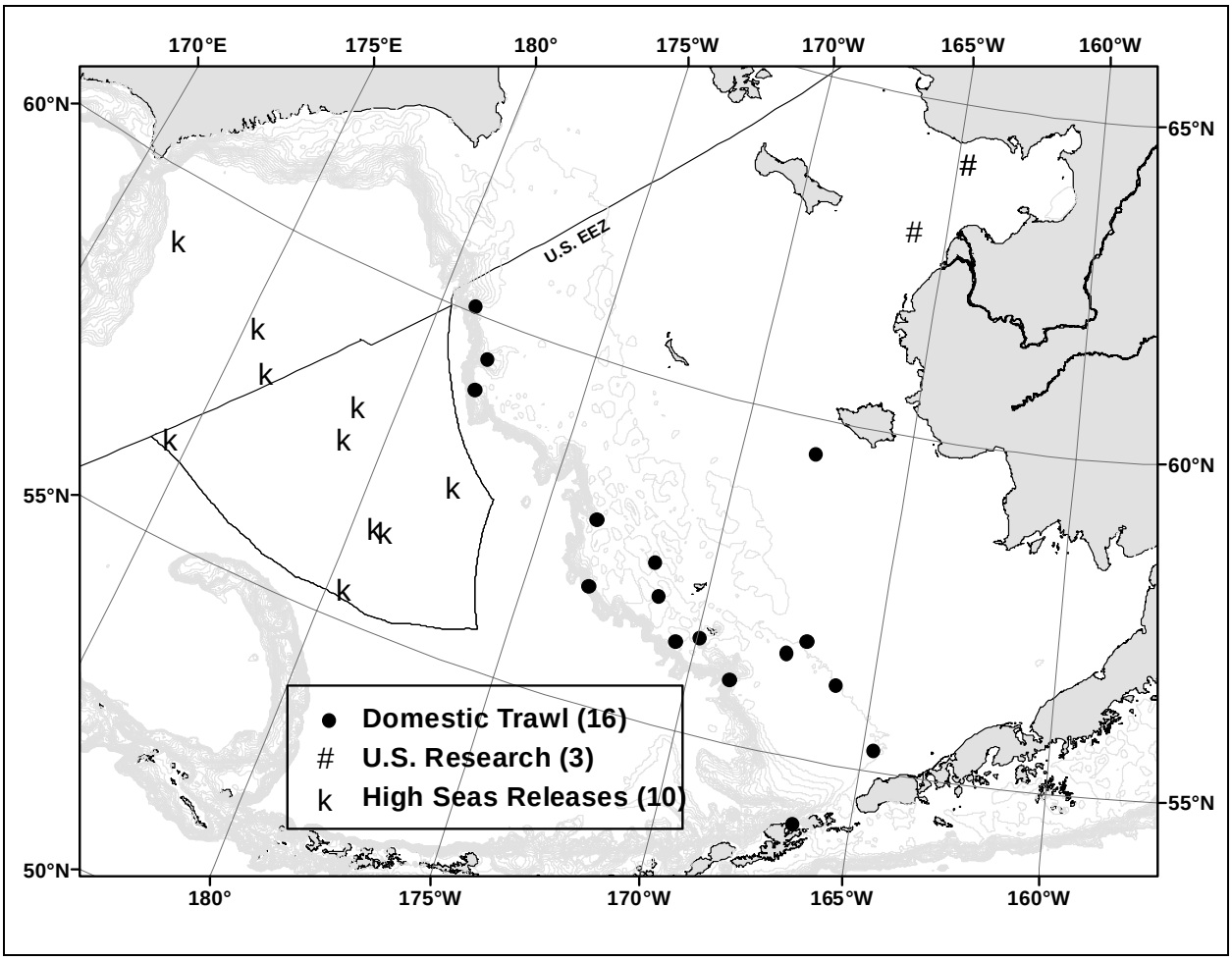


Figure 13.–Coded wire tagged Chinook salmon from the the Whitehorse hatchery recovered from the domestic and research catches in the Bering Sea, and high seas-tagged Chinook salmon recovered in the Yukon River.

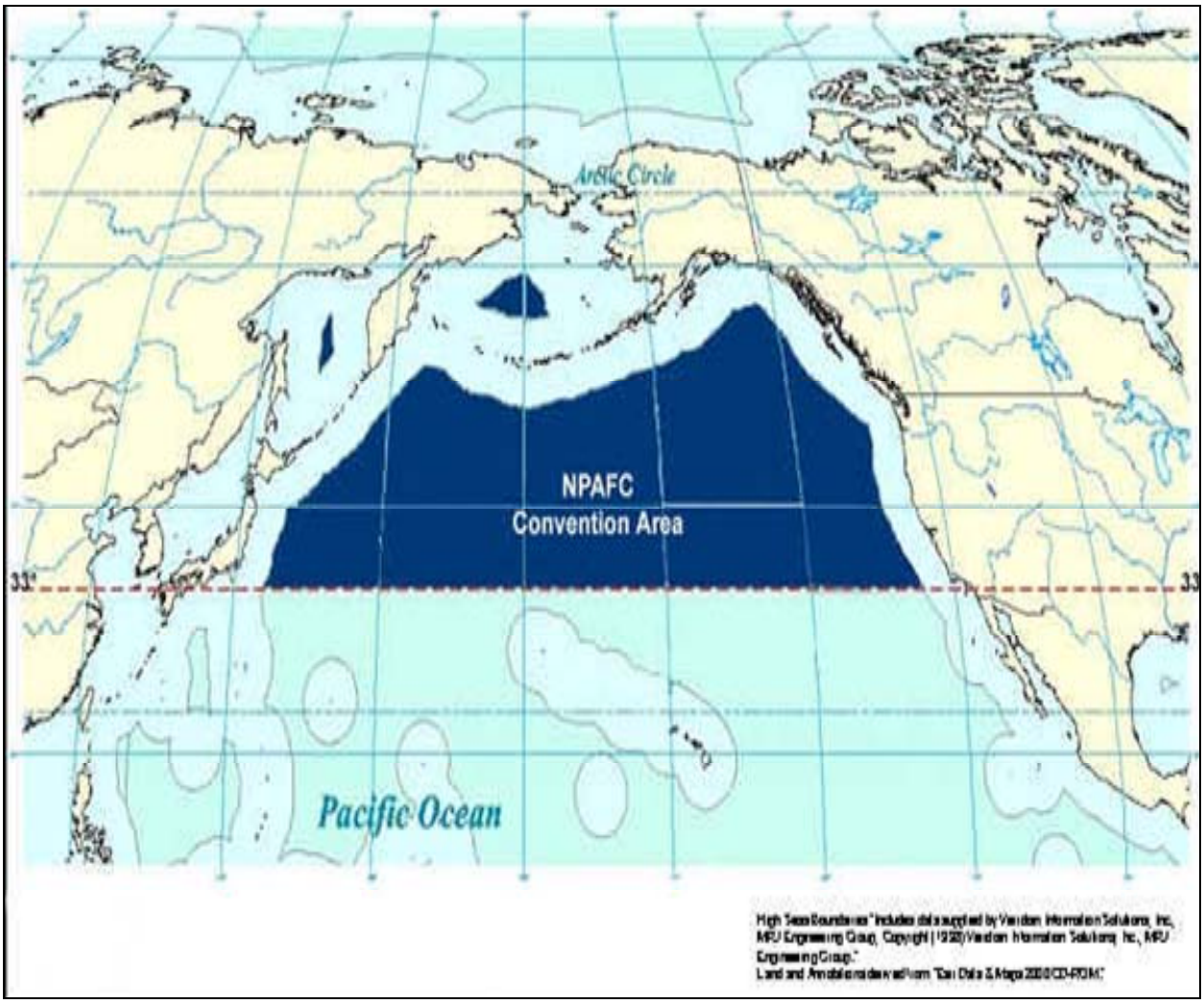


Figure 14.–The Convention prohibits direct fishing for anadromous fish (chum, coho, pink, sockeye, Chinook, and cherry salmon, and steelhead trout) in the Convention Area. The incidental taking of anadromous fish is to be minimized to the maximum extent practicable, and the retention of anadromous fish taken incidentally during fishing activity directed at non-anadromous fish is prohibited, and any such anadromous fish shall be returned immediately to the sea. The area to which the Convention applies is the waters of the North Pacific Ocean and its adjacent seas, north of 33 degrees North Latitude beyond the 200-mile zones of the costal States (see the map). The activities under this Convention, for scientific purposes, may extend farther southward in the North Pacific Ocean and its adjacent seas in areas beyond the 200 zones.

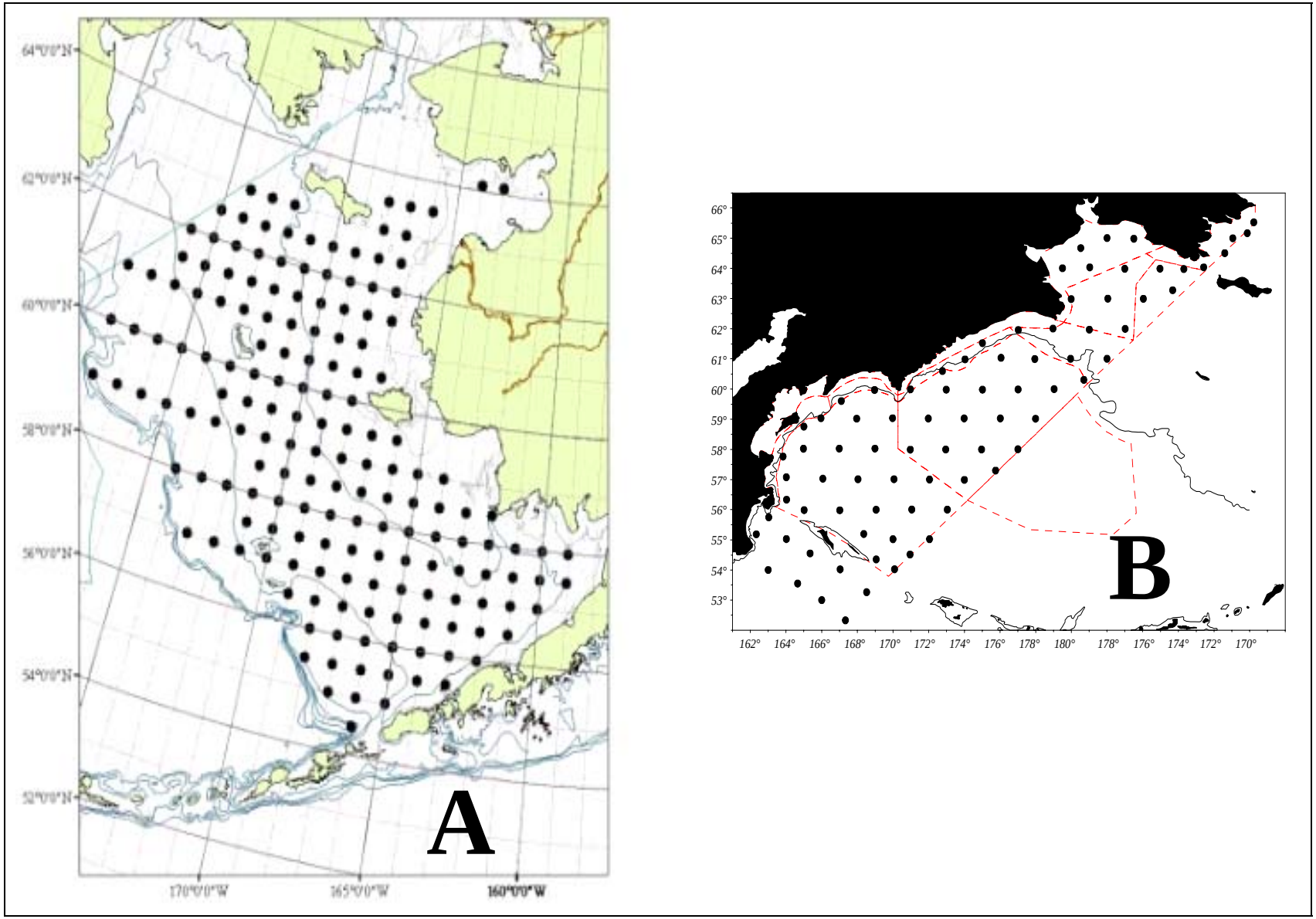


Figure 15.–Cruise plans for 2005 for the U.S BASIS (A), August 12 - October 10 and TINRO-CENTER (B), June - July.

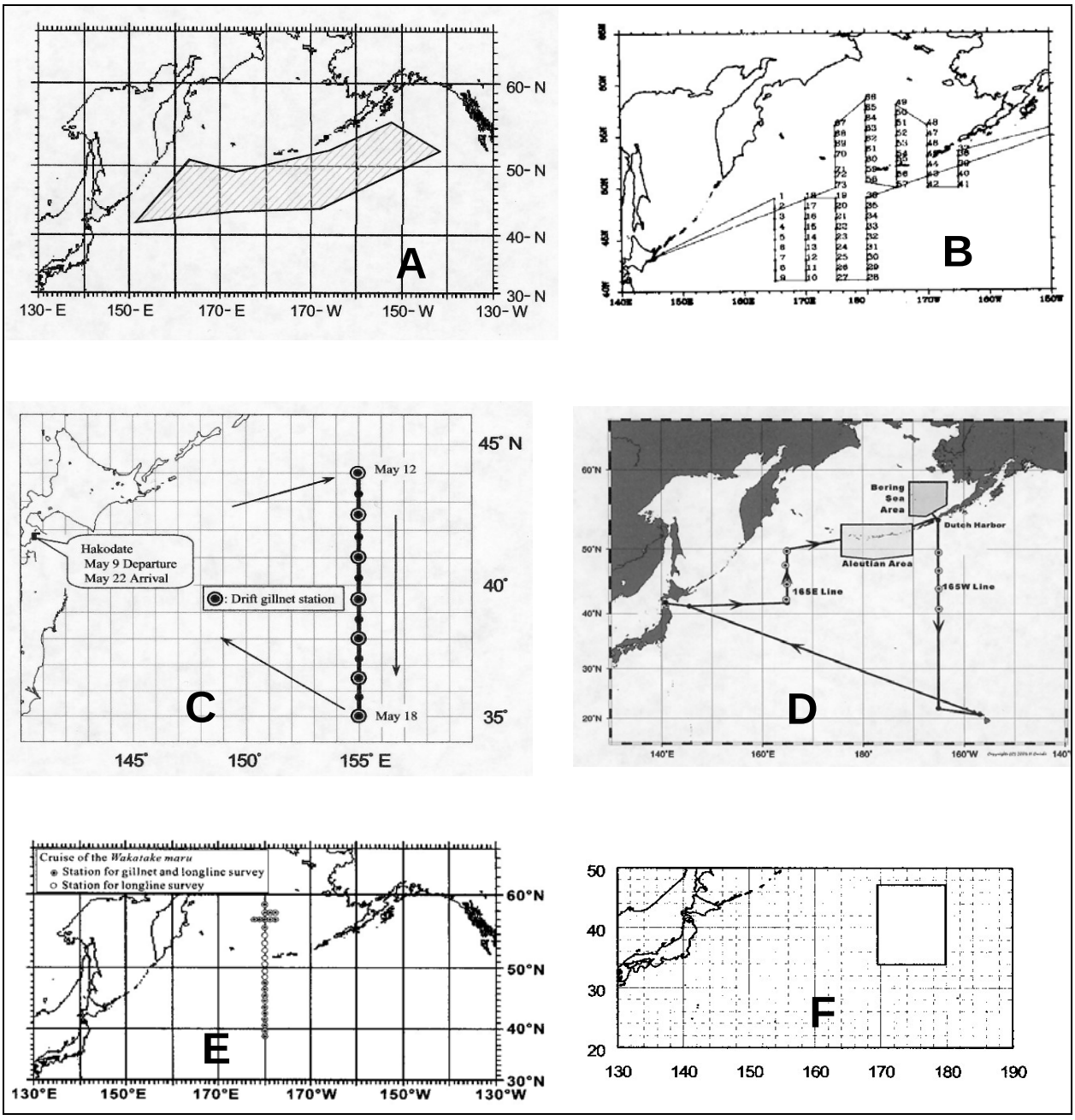


Figure 16.–Cruise plans for the Japanese in 2005: (A) Kaiyo maru Jan. 20-Mar. 10, (B) Kaiyo maru May 9-Jul. 3, (C) Oshoro maru May 9-May 22, (D) Oshoro maru Jun. 2-Jul. 31, (E) Wakatake maru Jun. 6-Jul. 21 and (F) Kaiun maru Jul 2-Aug. 6.

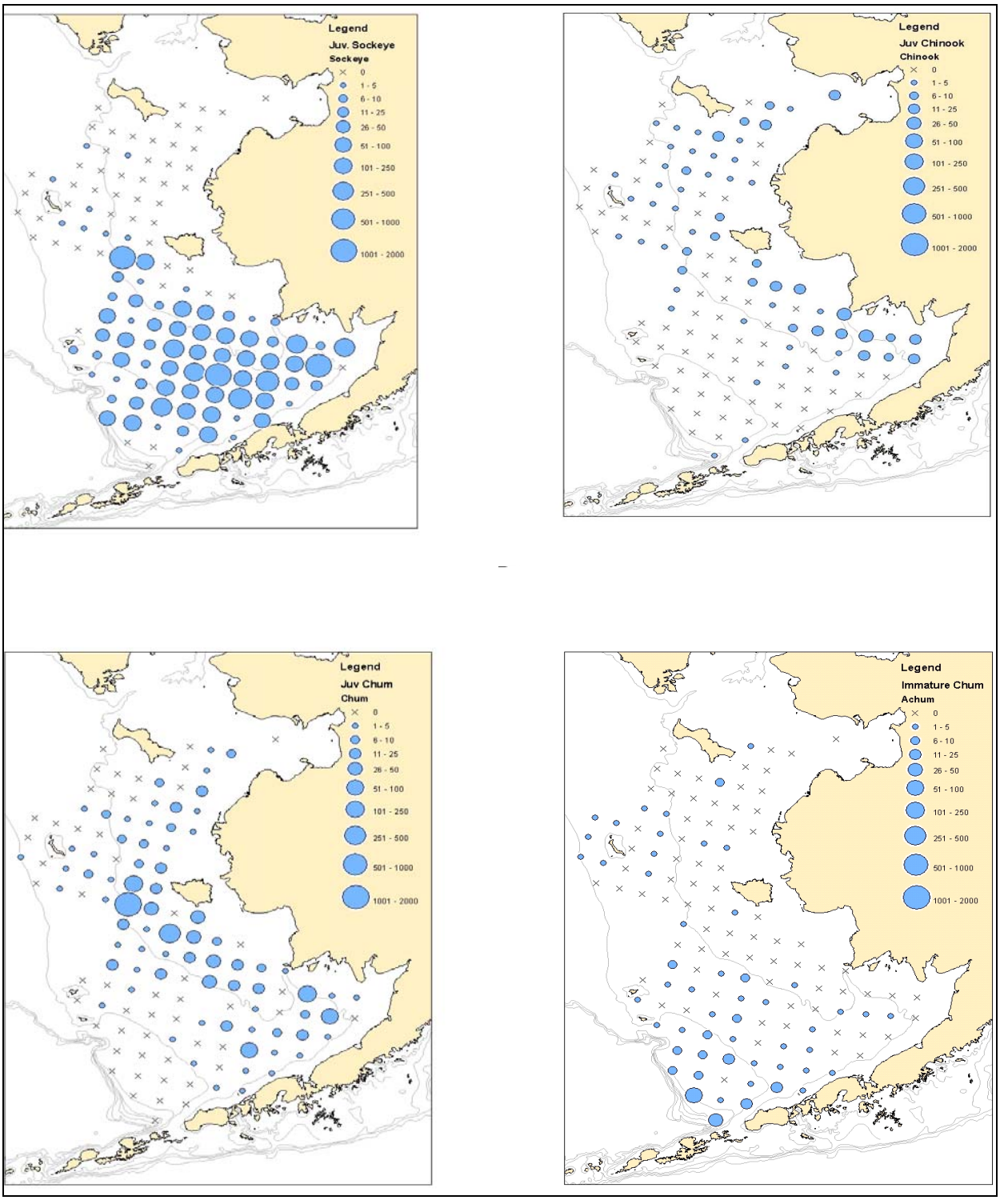


Figure 17.–Distribution of salmon catches from the 2005 U.S. BASIS cruise.

APPENDIX A: TABLES

Appendix A1.–Alaskan and Canadian total utilization of Yukon River Chinook, chum and coho salmon, 1903-2005.

	Alaska [a, b]			Canada [c]			Total		
Year	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total
1903				4,666		4,666	4,666		4,666
1904									
1905									
1906									
1907									
1908				7,000		7,000	7,000		7,000
1909				9,238		9,238	9,238		9,238
1910									
1911									
1912									
1913				12,133		12,133	12,133		12,133
1914				12,573		12,573	12,573		12,573
1915				10,466		10,466	10,466		10,466
1916				9,566		9,566	9,566		9,566
1917									
1918	12,239	1,500,065	1,512,304	7,066		7,066	19,305	1,500,065	1,519,370
1919	104,822	738,790	843,612	1,800		1,800	106,622	738,790	845,412
1920	78,467	1,015,655	1,094,122	12,000		12,000	90,467	1,015,655	1,106,122
1921	69,646	112,098	181,744	10,840		10,840	80,486	112,098	192,584
1922	31,825	330,000	361,825	2,420		2,420	34,245	330,000	364,245
1923	30,893	435,000	465,893	1,833		1,833	32,726	435,000	467,726
1924	27,375	1,130,000	1,157,375	4,560		4,560	31,935	1,130,000	1,161,935
1925	15,000	259,000	274,000	3,900		3,900	18,900	259,000	277,900
1926	20,500	555,000	575,500	4,373		4,373	24,873	555,000	579,873
1927		520,000	520,000	5,366		5,366	5,366	520,000	525,366
1928		670,000	670,000	5,733		5,733	5,733	670,000	675,733
1929		537,000	537,000	5,226		5,226	5,226	537,000	542,226
1930		633,000	633,000	3,660		3,660	3,660	633,000	636,660
1931	26,693	565,000	591,693	3,473		3,473	30,166	565,000	595,166
1932	27,899	1,092,000	1,119,899	4,200		4,200	32,099	1,092,000	1,124,099
1933	28,779	603,000	631,779	3,333		3,333	32,112	603,000	635,112
1934	23,365	474,000	497,365	2,000		2,000	25,365	474,000	499,365
1935	27,665	537,000	564,665	3,466		3,466	31,131	537,000	568,131
1936	43,713	560,000	603,713	3,400		3,400	47,113	560,000	607,113
1937	12,154	346,000	358,154	3,746		3,746	15,900	346,000	361,900
1938	32,971	340,450	373,421	860		860	33,831	340,450	374,281
1939		327,650	355,687	720		720	28,757	327,650	356,407
1940	32,453	1,029,000	1,061,453	1,153		1,153	33,606	1,029,000	1,062,606
1941	47,608	438,000	485,608	2,806		2,806	50,414	438,000	488,414
1942	22,487	197,000	219,487	713		713	23,200	197,000	220,200
1943	27,650	200,000	227,650	609		609	28,259	200,000	228,259
1944	14,232		14,232	986		986	15,218		15,218
1945	19,727		19,727	1,333		1,333	21,060		21,060
1946	22,782		22,782	353		353	23,135		23,135
1947	54,026		54,026	120		120	54,146		54,146
1948	33,842		33,842				33,842		33,842
1949	36,379		36,379				36,379		36,379
1950	41,808		41,808				41,808		41,808
1951	56,278		56,278				56,278		56,278
1952	38,637	10,868	49,505				38,637	10,868	49,505
1953	58,859	385,977	444,836				58,859	385,977	444,836
1954	64,545	14,375	78,920				64,545	14,375	78,920
1955	55,925		55,925				55,925		55,925
1956	62,208	10,743	72,951				62,208	10,743	72,951
1957	63,623		63,623				63,623		63,623
1958	75,625	337,500	413,125	11,000	1,500	12,500	86,625	339,000	425,625
1959	78,370		78,370	8,434	3,098	11,532	86,804	3,098	89,902
1960	67,597		67,597	9,653	15,608	25,261	77,250	15,608	92,858

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Year	Alaska [a, b] Chinook	Alaska [a, b] Other Salmon	Alaska [a, b] Total	Canada [c] Chinook	Canada [c] Other Salmon	Canada [c] Total	Total Chinook	Total Other Salmon	Total Total
1961	141,152	461,597	602,749	13,246	9,076	22,322	154,398	470,673	625,071
1962	105,844	434,663	540,507	13,937	9,436	23,373	119,781	444,099	563,880
1963	141,910	429,396	571,306	10,077	27,696	37,773	151,987	457,092	609,079
1964	109,818	504,420	614,238	7,408	12,187	19,595	117,226	516,607	633,833
1965	134,706	484,587	619,293	5,380	11,789	17,169	140,086	496,376	636,462
1966	104,887	309,502	414,389	4,452	13,192	17,644	109,339	322,694	432,033
1967	146,104	352,397	498,501	5,150	16,961	22,111	151,254	369,358	520,612
1968	118,632	270,818	389,450	5,042	11,633	16,675	123,674	282,451	406,125
1969	105,027	424,399	529,426	2,624	7,776	10,400	107,651	432,175	539,826
1970	93,019	585,760	678,779	4,663	3,711	8,374	97,682	589,471	687,153
1971	136,191	547,448	683,639	6,447	16,911	23,358	142,638	564,359	706,997
1972	113,098	461,617	574,715	5,729	7,532	13,261	118,827	469,149	587,976
1973	99,670	779,158	878,828	4,522	10,135	14,657	104,192	789,293	893,485
1974	118,053	1,229,678	1,347,731	5,631	11,646	17,277	123,684	1,241,324	1,365,008
1975	76,883	1,307,037	1,383,920	6,000	20,600	26,600	82,883	1,327,637	1,410,520
1976	105,582	1,026,908	1,132,490	5,025	5,200	10,225	110,607	1,032,108	1,142,715
1977	114,494	1,090,758	1,205,252	7,527	12,479	20,006	122,021	1,103,237	1,225,258
1978	129,988	1,615,312	1,745,300	5,881	9,566	15,447	135,869	1,624,878	1,760,747
1979	159,232	1,596,133	1,755,365	10,375	22,084	32,459	169,607	1,618,217	1,787,824
1980	197,665	1,730,960	1,928,625	22,846	23,718 [d]	46,564	220,511	1,754,678	1,975,189
1981	188,477	2,097,871	2,286,348	18,109	22,781 [d]	40,890	206,586	2,120,652	2,327,238
1982	152,808	1,265,457	1,418,265	17,208	16,091 [d]	33,299	170,016	1,281,548	1,451,564
1983	198,436	1,678,597	1,877,033	18,952	29,490 [d]	48,442	217,388	1,708,087	1,925,475
1984	162,683	1,548,101	1,710,784	16,795	29,767 [d]	46,562	179,478	1,577,868	1,757,346
1985	187,327	1,657,984	1,845,311	19,301	41,515 [d]	60,816	206,628	1,699,499	1,906,127
1986	146,004	1,758,825	1,904,829	20,364	14,843 [d]	35,207	166,368	1,773,668	1,940,036
1987	188,386	1,246,176	1,434,562	17,614	44,786 [d]	62,400	206,000	1,290,962	1,496,962
1988	148,421	2,311,214	2,459,635	21,427	33,915 [d]	55,342	169,848	2,345,129	2,514,977
1989	157,606	2,281,566	2,439,172	17,944	23,490 [d]	41,434	175,550	2,305,056	2,480,606
1990	149,433	1,053,351	1,202,784	19,227	34,302 [d]	53,529	168,660	1,087,653	1,256,313
1991	154,651	1,335,111	1,489,762	20,607	35,653 [d]	56,260	175,258	1,370,764	1,546,022
1992	168,191	863,575	1,031,766	17,903	21,310 [d]	39,213	186,094	884,885	1,070,979
1993	163,078	342,197	505,275	16,611	14,150 [d]	30,761	179,689	356,347	536,036
1994	172,315	577,233	749,548	21,198	38,342	59,540	193,513	615,575	809,088
1995	177,663	1,437,837	1,615,500	20,884	46,109	66,993	198,547	1,483,946	1,682,493
1996	138,562	1,121,181	1,259,743	19,612	24,395	44,007	158,174	1,145,576	1,303,750
1997	174,625	544,879	719,504	16,528	15,880	32,408	191,153	560,759	751,912
1998	99,369	199,735	299,104	5,937 [f]	8,115	14,052	105,306	207,850	313,156
1999	124,315	234,221	358,536	12,468	19,606	32,074	136,783	253,827	390,610
2000	45,308	106,936	152,244	4,879 [g]	9,273	14,152	50,187	116,209	166,396
2001	53,738	116,477	170,215	10,139	9,882	20,021	63,877	126,359	190,236
2002	68,112	122,350	190,462	9,257	8,493	17,750	77,369	130,843	208,212
2003	98,696	199,798	298,494	9,616	11,885	21,501	108,312	211,683	319,995
2004	111,557	203,639	315,196	11,238	9,930	21,168	122,795	213,569	336,364
2005 [h, i]	85,166	473,941	559,107	11,074	18,335	29,409	96,240	492,276	588,516
Average									
1903-04	91,102	744,680	728,155	8,721	18,033	18,811	87,564	736,345	690,740
1995-04	109,195	428,705	537,900	12,056	16,357	28,413	121,250	445,062	566,312
2000-04	75,482	149,840	225,322	9,026	9,893	18,918	84,508	159,733	244,241

[a] Catch in number of salmon. Includes estimated number of salmon harvested for the commercial production of salmon roe.

[b] Commercial, subsistence, personal-use, test fish retained for subsistence, and sport catches combined. Totals do not include the Coastal District communities of Hooper Bay and Scammon Bay.

[c] Catch in number of salmon. Commercial, Aboriginal, domestic and sport catches combined.

[d] Includes the Old Crow Aboriginal fishery harvest of coho salmon.

[f] Catch includes 761 chinook salmon taken in the mark-recapture test fishery.

[g] Catch includes 737 chinook salmon taken in the test fishery.

[h] Data are preliminary.

[i] Subsistence, Personal Use and Sport Fish harvest data are unavailable at this time.

Appendix A2.–Alaskan catch of Yukon River Chinook salmon, 1961-2005.

Year	Estimated Subsistence Use [a]	Harvest			
		Subsistence [b]	Commercial [c]	Sport [d]	Total
1961	21,488	21,488	119,664		141,152
1962	11,110	11,110	94,734		105,844
1963	24,862	24,862	117,048		141,910
1964	16,231	16,231	93,587		109,818
1965	16,608	16,608	118,098		134,706
1966	11,572	11,572	93,315		104,887
1967	16,448	16,448	129,656		146,104
1968	12,106	12,106	106,526		118,632
1969	14,000	14,000	91,027		105,027
1970	13,874	13,874	79,145		93,019
1971	25,684	25,684	110,507		136,191
1972	20,258	20,258	92,840		113,098
1973	24,317	24,317	75,353		99,670
1974	19,964	19,964	98,089		118,053
1975	13,045	13,045	63,838		76,883
1976	17,806	17,806	87,776		105,582
1977	17,581	17,581	96,757	156	114,494
1978	30,297	30,297	99,168	523	129,988
1979	31,005	31,005	127,673	554	159,232
1980	42,724	42,724	153,985	956	197,665
1981	29,690	29,690	158,018	769	188,477
1982	28,158	28,158	123,644	1,006	152,808
1983	49,478	49,478	147,910	1,048	198,436
1984	42,428	42,428	119,904	351	162,683
1985	39,771	39,771	146,188	1,368	187,327
1986	45,238	45,238	99,970	796	146,004
1987	53,124	53,124	134,760 [f]	502	188,386
1988	46,032	46,032	101,445	944	148,421
1989	51,062	51,062	105,491	1,053	157,606
1990	51,594	51,181	97,708	544	149,433
1991	48,311	46,773	107,105	773	154,651
1992	46,553	45,626	122,134	431	168,191
1993	66,261	65,701	95,682	1,695	163,078
1994	55,266	54,563	115,471	2,281	172,315
1995	50,258	48,934	126,204	2,525	177,663
1996	43,827	43,521	91,890	3,151	138,562
1997	57,060	56,291	116,421	1,913	174,625
1998	54,171	54,090	44,625	654	99,369
1999	52,813	52,525	70,767	1,023	124,315
2000	36,075	35,916	9,115	277	45,308
2001	53,059	53,059	0	679	53,738
2002	42,746	42,746	24,880	486	68,112
2003	55,313	55,313	40,664	2,719	98,696
2004	53,876	53,876	56,168	1,513	111,557
2005	52,827 [h]	52,827 [h]	32,339	[g]	85,166 [h]
Average					
1961-04	35,299	35,138	97,840	1,096	133,675
1995-04	50,406	49,627	58,073	1,494	109,195
2000-04	48,214	48,182	26,165	1,135	75,482

[a] Includes salmon harvested for subsistence and personal use purposes, and an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence. These data are only available since 1990. Totals do not include the Coastal District communities of Hooper Bay and Scammon Bay.

[b] Includes salmon harvested for subsistence and personal use. Totals do not include the Coastal District communities of Hooper Bay and Scammon Bay.

[c] Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for the production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

[d] Sport fish harvest for the Alaskan portion of the Yukon River drainage. Most of this harvest is believed to have been taken within the Tanana River drainage (see Schultz et al. 1993: 1992 Yukon Area AMR).

[f] Includes 653 and 2,136 Chinook salmon illegally sold in District 5 and 6 (Tanana River), respectively.

[g] Data are unavailable at this time.

[h] Data are preliminary.

Appendix A3.–Alaska catch of Yukon River summer chum salmon, 1961-2005.

Year	Estimated Subsistence Use [a]	Harvest			
		Subsistence [b]	Commercial [c]	Sport [d]	Total
1961	305,317 [f]	305,317 [f]			305,317
1962	261,856 [f]	261,856 [f]			261,856
1963	297,094 [f]	297,094 [f]			297,094
1964	361,080 [f]	361,080 [f]			361,080
1965	336,848 [f]	336,848 [f]			336,848
1966	154,508 [f]	154,508 [f]			154,508
1967	206,233 [f]	206,233 [f]	10,935		217,168
1968	133,880 [f]	133,880 [f]	14,470		148,350
1969	156,191 [f]	156,191 [f]	61,966		218,157
1970	166,504 [f]	166,504 [f]	137,006		303,510
1971	171,487 [f]	171,487 [f]	100,090		271,577
1972	108,006 [f]	108,006 [f]	135,668		243,674
1973	161,012 [f]	161,012 [f]	285,509		446,521
1974	227,811 [f]	227,811 [f]	589,892		817,703
1975	211,888 [f]	211,888 [f]	710,295		922,183
1976	186,872 [f]	186,872 [f]	600,894		787,766
1977	159,502	159,502	534,875	316	694,693
1978	197,144	171,383	1,077,987	451	1,249,821
1979	196,187	155,970	819,533	328	975,831
1980	272,398	167,705	1,067,715	483	1,235,903
1981	208,284	117,629	1,279,701	612	1,397,942
1982	260,969	117,413	717,013	780	835,206
1983	240,386	149,180	995,469	998	1,145,647
1984	230,747	166,630	866,040	585	1,033,255
1985	264,828	157,744	934,013	1,267	1,093,024
1986	290,825	182,337	1,188,850	895	1,372,082
1987	275,914	174,940	622,541	846	798,327
1988	311,742	198,824	1,620,269	1,037	1,820,130
1989	249,582	169,046	1,463,345	2,131	1,634,522
1990	201,839 [g]	117,436	525,440	472	643,348
1991	275,673 [g]	118,540	662,036	1,037	781,613
1992	261,448 [g]	125,497	545,544	1,308	672,349
1993	139,541 [g]	106,054	141,985	564	248,603
1994	245,973 [g]	132,494	261,953	350	394,797
1995	221,308 [g]	119,503	824,487	1,174	945,164
1996	248,856 [g]	103,408	689,542	1,854	794,804
1997	177,506	97,500	230,842	475	328,817
1998	86,275	86,088	31,817	421	118,326
1999	70,729	70,705	29,412	555	100,672
2000	72,831	64,925	7,272	161	72,358
2001	58,385	58,385	0	82	58,467
2002	72,435	72,435	13,785	384	86,604
2003	68,452	68,452	10,685	1,638	80,775
2004	69,903	69,903	26,410	203	96,516
2005	78,914 [i]	78,914 [i]	41,398	[h]	120,312 [i]
Average					
1961-04	201,733	157,869	521,981	765	621,079
1995-04	196,587	81,130	186,425	695	268,250
2000-04	195,070	66,820	11,630	494	78,944

[a] Includes salmon harvested for subsistence and personal use purposes, and an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence. These data are only available since 1990. Totals do not include the Coastal District communities of Hooper Bay and Scammon Bay.

[b] Includes salmon harvested for subsistence and personal use. Totals do not include the Coastal District communities of Hooper Bay and Scammon Bay.

[c] Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for the production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

[d] Includes both summer and fall chum salmon sport fish harvest within the Alaskan portion of the Yukon River drainage. The majority of this harvest is believed to have been taken within the Tanana River drainage.

[f] Catches estimated because catches of species other than Chinook salmon were not differentiated.

[g] Subsistence harvest, summer chum salmon commercially harvested for the production of salmon roe in District 5 and 6, and the estimated subsistence use of commercially-harvested summer chum salmon in District 4.

[h] Data are unavailable at this time.

[i] Data are preliminary.

Appendix A4.–Value of commercial salmon fishery to Yukon Area fishermen, 1977-2005 in US dollars.

	Summer Season							Fall Season							
	Chinook			Summer Chum				Fall Chum			Coho				
	Lower	Upper		Lower	Upper		Total	Lower	Upper		Lower	Upper		Total	Total
Year	Value	Value	Subtotal	Value	Value	Subtotal	Season	Value	Value	Subtotal	Value	Value	Subtotal	Season	Value
1977	1,841,033	148,766	1,989,799	1,007,280	306,481	1,313,761	3,303,560	718,571	102,170	820,741	140,914	2,251	143,165	963,906	4,267,466
1978	2,048,674	66,472	2,115,146	2,071,434	655,738	2,727,172	4,842,318	691,854	103,091	794,945	96,823	6,105	102,928	897,873	5,740,191
1979	2,763,433	124,230	2,887,663	2,242,564	444,924	2,687,488	5,575,151	1,158,485	347,814	1,506,299	83,466	6,599	90,065	1,596,364	7,171,515
1980	3,409,105	113,662	3,522,767	1,027,738	627,249	1,654,987	5,177,754	394,162	198,088	592,250	17,374	2,374	19,748	611,998	5,789,752
1981	4,420,669	206,380	4,627,049	2,741,178	699,876	3,441,054	8,068,103	1,503,744	356,805	1,860,549	87,385	4,568	91,953	1,952,502	10,020,605
1982	3,768,107	162,699	3,930,806	1,237,735	452,837	1,690,572	5,621,378	846,492	53,258	899,750	135,828	18,786	154,614	1,054,364	6,675,742
1983	4,093,562	105,584	4,199,146	1,734,270	281,883	2,016,153	6,215,299	591,011	128,950	719,961	17,497	11,472	28,969	748,930	6,964,229
1984	3,510,923	102,354	3,613,277	926,922	382,776	1,309,698	4,922,975	374,359	103,417	477,776	256,050	12,823	268,873	746,649	5,669,624
1985	4,294,432	82,644	4,377,076	1,032,700	593,801	1,626,501	6,003,577	634,616	178,125	812,741	176,254	26,797	203,051	1,015,792	7,019,369
1986	3,165,078	73,363	3,238,441	1,746,455	634,091	2,380,546	5,618,987	399,321	30,309	429,630	211,942	556	212,498	642,128	6,261,115
1987	5,428,933	136,196	5,565,129	1,313,618	323,611	1,637,229	7,202,358								7,202,358
1988	5,463,800	142,284	5,606,084	5,001,100	1,213,991	6,215,091	11,821,175	638,700	151,300	790,000	734,400	34,116	768,516	1,558,516	13,379,691
1989	5,181,700	108,178	5,289,878	2,217,700	1,377,117	3,594,817	8,884,695	713,400	223,996	937,396	323,300	33,959	357,259	1,294,655	10,179,350
1990	4,820,859	105,295	4,926,154	497,571	506,611	1,004,182	5,930,336	238,165	174,965	413,130	137,302	37,026	174,328	587,458	6,517,794
1991	7,128,300	97,140	7,225,440	782,300	627,177	1,409,477	8,634,917	438,310	157,831	596,141	300,182	21,556	321,738	917,879	9,552,796
1992	9,957,002	168,999	10,126,001	606,976	525,204	1,132,180	11,258,181		54,161	54,161		19,529	19,529	73,690	11,331,871
1993	4,884,044	113,217	4,997,261	226,772	203,762	430,534	5,427,795								5,427,795
1994	4,169,270	124,270	4,293,540	79,206	396,685	475,891	4,769,431		8,517	8,517		8,739	8,739	17,256	4,786,687
1995	5,317,508	87,059	5,404,567	241,598	1,060,322	1,301,920	6,706,487	185,036	167,571	352,607	80,019	11,292	91,311	443,918	7,150,405
1996	3,491,582	47,282	3,538,864	89,020	966,277	1,055,297	4,594,161	48,579	45,438	94,017	96,795	13,020	109,815	203,832	4,797,993
1997	5,450,433	110,713	5,561,146	56,535	96,806	153,341	5,714,487	86,526	7,252	93,778	79,973	1,062	81,035	174,813	5,889,300
1998	1,911,370	17,285	1,928,655	26,415	821	27,236	1,955,891								1,955,891
1999	4,950,522	74,475	5,024,997	19,687	1,720	21,407	5,046,404	35,639	876	36,515	3,620		3,620	40,135	5,086,539
2000	725,606		725,606	8,633		8,633	734,239								734,239
2001	[a]														-
2002	1,691,105	20,744	1,711,849	4,342	6,176	10,518	1,722,367	[a]			[a]				1,722,367
2003	1,871,202	40,957	1,912,159	1,585	6,879	8,464	1,920,623	5,993	3,398	9,391	18,168	5,095	23,263	32,654	1,953,277
2004	3,063,667	38,290	3,101,957	8,884	9,645	18,529	3,120,486	1,126	848	1,974	2,774	6,372	9,146	11,120	3,131,606
2005	1,952,109	24,415	1,976,524	11,004	13,479	24,483	2,001,007	316,698	48,159	364,857	83,793	19,182	102,975	467,832	2,468,839
Averages															
1977-04	3,956,215	100,713	4,127,424	998,156	477,018	1,457,507	5,584,931	510,682	123,682	585,728	150,003	13,528	149,571	708,474	6,162,206
1995-04	3,163,666	54,601	3,212,200	50,744	268,581	289,483	3,501,683	60,483	37,564	98,047	46,892	7,368	53,032	151,079	3,786,300
2000-04	1,837,895	33,330	1,862,893	5,861	7,567	11,536	1,874,429	3,560	2,123	5,683	10,471	5,734	16,205	21,887	1,885,372

[a] No fishery took place.

Appendix A5.–Alaskan catch of Yukon River fall chum salmon, 1961-2005.

Year	Estimated Subsistence Use [a]	Harvest		
		Subsistence [b]	Commercial [c]	Total
1961	101,772 [f] [g]	101,772	42,461	144,233
1962	87,285 [f] [g]	87,285	53,116	140,401
1963	99,031 [f] [g]	99,031		99,031
1964	120,360 [f] [g]	120,360	8,347	128,707
1965	112,283 [f] [g]	112,283	23,317	135,600
1966	51,503 [f] [g]	51,503	71,045	122,548
1967	68,744 [f] [g]	68,744	38,274	107,018
1968	44,627 [f] [g]	44,627	52,925	97,552
1969	52,063 [f] [g]	52,063	131,310	183,373
1970	55,501 [f] [g]	55,501	209,595	265,096
1971	57,162 [f] [g]	57,162	189,594	246,756
1972	36,002 [f] [g]	36,002	152,176	188,178
1973	53,670 [f] [g]	53,670	232,090	285,760
1974	93,776 [f] [g]	93,776	289,776	383,552
1975	86,591 [f] [g]	86,591	275,009	361,600
1976	72,327 [f] [g]	72,327	156,390	228,717
1977	82,771	82,771 [f]	257,986	340,757
1978	94,867	84,239 [f]	247,011	331,250
1979	233,347	214,881	378,412	593,293
1980	172,657	167,637	298,450	466,087
1981	188,525	177,240	477,736	654,976
1982	132,897	132,092	224,992	357,084
1983	192,928	187,864	307,662	495,526
1984	174,823	172,495	210,560	383,055
1985	206,472	203,947	270,269	474,216
1986	164,043	163,466	140,019	303,485
1987	361,663	361,663 [g]		361,663
1988	158,694	155,467	164,210	319,677
1989	230,978	216,229	301,928	518,157
1990	185,244	173,076	143,402	316,478
1991	168,890	145,524	258,154	403,678
1992	110,903	107,602	20,429	128,031
1993	76,925	76,925		76,925
1994	127,586	123,218	7,999	131,217
1995	163,693	131,369	284,178	415,547
1996	146,154	129,222	107,347	236,569
1997	96,899	95,425	59,054	154,479
1998	62,869	62,869		62,869
1999	89,999	89,998	20,371	110,369

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Year	Estimated Subsistence Use [a]	Harvest		
		Subsistence [b]	Commercial [c]	Total
2000	19,307	19,307		19,307
2001	35,154	35,154		35,154
2002	19,393	19,393		19,393
2003	57,178	57,178	10,996	68,174
2004	62,436	62,436	3,729	66,165
2005	90,340 [m]	90,340 [m]	178,987 [m]	269,327
Average				
1961-04	113,863	110,031	165,414	249,130
1995-04	75,308	70,235	80,946	118,803
2000-04	38,694	38,694	7,363	41,639

[a] Includes salmon harvested for subsistence and personal use purposes, and an estimate of number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence. These data are only available since 1990.

[b] Includes salmon harvested for subsistence and personal use.

[c] Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

[d] Does not include sport-fish harvest. The majority of the sport-fish harvest is believed to be taken in the Tanana River drainage. Sport fish division does not differentiate between the two races of chum salmon. However, most of this harvest is believed to be summer chum salmon.

[f] Catches estimated because catches of species other than chinook salmon were not differentiated.

[g] Minimum estimates because surveys were conducted prior to the end of the fishing season.

[h] Includes an estimated 95,768 and 119,168 fall chum salmon illegally sold in Districts 5 and 6 (Tanana River), respectively.

[j] Commercial fishery operated only in District 6, the Tanana River.

[k] Data are unavailable at this time.

[m] Data are preliminary.

Appendix A6.–Alaskan catch of Yukon River coho salmon, 1961-2005.

Year	Estimated Subsistence Use [a]	Harvest			
		Subsistence [b]	Commercial [c]	Sport [d]	Total
1961	9,192 [f, g]	9,192 [f, g]	2,855		12,047
1962	9,480 [f, g]	9,480 [f, g]	22,926		32,406
1963	27,699 [f, g]	27,699 [f, g]	5,572		33,271
1964	12,187 [f, g]	12,187 [f, g]	2,446		14,633
1965	11,789 [f, g]	11,789 [f, g]	350		12,139
1966	13,192 [f, g]	13,192 [f, g]	19,254		32,446
1967	17,164 [f, g]	17,164 [f, g]	11,047		28,211
1968	11,613 [f, g]	11,613 [f, g]	13,303		24,916
1969	7,776 [f, g]	7,776 [f, g]	15,093		22,869
1970	3,966 [f, g]	3,966 [f, g]	13,188		17,154
1971	16,912 [f, g]	16,912 [f, g]	12,203		29,115
1972	7,532 [f, g]	7,532 [f, g]	22,233		29,765
1973	10,236 [f, g]	10,236 [f, g]	36,641		46,877
1974	11,646 [f, g]	11,646 [f, g]	16,777		28,423
1975	20,708 [f, g]	20,708 [f, g]	2,546		23,254
1976	5,241 [f, g]	5,241 [f, g]	5,184		10,425
1977	16,333 [g]	16,333 [g]	38,863	112	55,308
1978	7,787 [g]	7,787 [g]	26,152	302	34,241
1979	9,794	9,794	17,165	50	27,009
1980	20,158	20,158	8,745	67	28,970
1981	21,228	21,228	23,680	45	44,953
1982	35,894	35,894	37,176	97	73,167
1983	23,905	23,905	13,320	199	37,424
1984	49,020	49,020	81,940	831	131,791
1985	32,264	32,264	57,672	808	90,744
1986	34,468	34,468	47,255	1,535	83,258
1987	84,894	84,894	[h]	1,292	86,186
1988	69,080	69,080	99,907	2,420	171,407
1989	41,583	41,583	85,493	1,811	128,887
1990	47,896	44,641	46,937	1,947	93,525
1991	40,894	37,388	109,657	2,775	149,820
1992	53,344	51,921	9,608 [j]	1,666	63,195
1993	15,772	15,772		897	16,669
1994	48,926	44,594	4,451	2,174	51,219
1995	29,716	28,642	47,206	1,278	77,126
1996	33,651	30,510	57,710	1,588	89,808
1997	24,579	24,295	35,818	1,470	61,583
1998	17,781	17,781	1	758	18,540
1999	20,970	20,970	1,601	609	23,180
2000	14,717	14,717		554	15,271
2001	21,654	21,654		1,202	22,856
2002	15,261	15,261		1,092	16,353
2003	24,129	24,129	25,243	1,477	50,849
2004	20,965	20,965	19,993	1,623	40,958
2005	25,991 [m]	25,991 [m]	58,311 [m]	[k]	84,302
Average					
1961-04	24,740	24,344	28,799	1,096	49,597
1995-04	22,342	21,892	26,796	1,165	41,652
2000-04	19,345	19,345	22,618	1,190	29,257

[a] Includes salmon harvested for subsistence and personal use purposes, and an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence. These data are only available since 1990.

[b] Includes salmon harvested for subsistence and personal use.

[c] Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for the production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

[d] Sport fish harvest for the Alaskan portion of the Yukon River drainage. The majority of this harvest is believed to have been taken within the Tanana River drainage (see Schultz et al. 1993: 1992 Yukon Area AMR).

[f] Catches estimated because catches of species other than Chinook were not differentiated.

[g] Minimum estimates because surveys were conducted before the end of the fishing season.

[h] Includes an estimated 5,015 and 31,276 coho salmon illegally sold in Districts 5 and 6 (Tanana River), respectively.

[j] Commercial fishery operated only in District 6, the Tanana River.

[k] Data are unavailable at this time.

[m] Data are preliminary.

Appendix A7.–Number of participating commercial salmon fishing gear permit holders by district and season, Yukon Area in Alaska, 1971-2005.[a]

	Chinook and Summer Chum Salmon Season								Yukon
	Lower Yukon Area				Upper Yukon Area				Area
Year	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	Total
1971	405	154	33	592	-	-	-	-	592
1972	426	153	35	614	-	-	-	-	614
1973	438	167	38	643	-	-	-	-	643
1974	396	154	42	592	27	31	20	78	670
1975	441	149	37	627	93	52	36	181	808
1976	453	189	42	684	80	46	29	155	839
1977	392	188	46	626	87	41	18	146	772
1978	429	204	22	655	80	45	35	160	815
1979	425	210	22	657	87	34	30	151	808
1980	407	229	21	657	79	35	33	147	804
1981	448	225	23	696	80	43	26	149	845
1982	450	225	21	696	74	44	20	138	834
1983	455	225	20	700	77	34	25	136	836
1984	444	217	20	613	54	31	27	112	725
1985	425	223	18	666	74	32	27	133	799
1986	441	239	7	672	75	21	27	123	795
1987	440	239	13	659	87	30	24	141	800
1988	456	250	22	678	95	28	33	156	834
1989	445	243	16	687	98	32	29	159	846
1990	453	242	15	679	92	27	23	142	821
1991	489	253	27	678	85	32	22	139	817
1992	438	263	19	679	90	28	19	137	816
1993	448	238	6	682	75	30	18	123	805
1994	414	250	7	659	55	28	20	103	762
1995	439	233	0	661	87	28	21	136	797
1996	448	189	9	627	87	23	15	125	752
1997	457	188	0	639	39	29	15	83	722
1998	434	231	0	643	0	18	10	28	671
1999	412	217	5	631	5	26	6	37	668
2000	350	214	0	562	0	0	0	0	562
2001	0	0	0	0	0	0	0	0	0
2002	322	223	0	540	0	18	6	24	564
2003	351	217	0	556	3	16	7	23	579
2004	396	212	0	549	0	14	6	20	569
2005	370	228	0	578	0	12	5	17	595
5-Year Average									
2000-2004	284	173	0	441	1	10	4	13	455
1995-2004	361	192	1	541	22	17	9	48	588

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	Fall Chum and Coho Salmon Season								
	Lower Yukon Area				Upper Yukon Area				Yukon
Year	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	Total
1971	352	-	-	352	-	-	-	-	352
1972	353	75	3	431	-	-	-	-	431
1973	445	183		628	-	-	-	-	628
1974	322	121	6	449	17	23	22	62	511
1975	428	185	12	625	44	33	33	110	735
1976	422	194	28	644	18	36	44	98	742
1977	337	172	37	546	28	34	32	94	640
1978	429	204	28	661	24	43	30	97	758
1979	458	220	32	710	31	44	37	112	822
1980	395	232	23	650	33	43	26	102	752
1981	462	240	21	723	30	50	30	110	833
1982	445	218	15	678	15	24	25	64	742
1983	312	224	18	554	13	29	23	65	619
1984	327	216	12	536	18	39	26	83	619
1985	345	222	13	559	22	39	25	86	645
1986	282	231	14	510	1	21	16	38	548
1987	0	0	0	0	0	0	0	0	0
1988	328	233	13	563	20	20	32	72	635
1989	332	229	22	550	20	24	28	72	622
1990	301	227	19	529	11	11	27	49	578
1991	319	238	19	540	8	21	25	54	594
1992	0	0	0	0	0	0	22	22	22
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	1	11	12	12
1995	189	172	0	357	4	12	20	36	393
1996	158	109	0	263	1	17	17	35	298
1997	176	130	0	304	3	8	0	11	315
1998	0	0	0	0	0	0	0	0	0
1999	146	110	0	254	4	0	0	4	258
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	75	0	0	75	2	0	5	7	82
2004	26	0	0	26	0	0	6	6	32
2005	177	0	0	177	0	0	7	7	184
Average									
1971-04	240	133	10	374	12	18	18	48	418
1995-04	77	52	0	128	1	4	5	10	138
2000-04	20	0	0	20	0	0	2	3	23

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	Combined Season								
	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	Total
1971	473	154	33	660	-	-	-	27	687
1972	476	153	35	664	-	-	-	-	664
1973	529	205	38	772	-	-	-	47	819
1974	485	190	42	717	28	43	27	98	815
1975	491	197	39	727	95	57	46	198	925
1976	482	220	44	746	96	62	56	214	960
1977	402	208	54	609	96	53	39	188	797
1978	472	221	29	650	82	53	38	173	823
1979	461	230	33	661	90	49	40	179	840
1980	432	247	27	654	88	51	38	177	831
1981	507	257	26	666	94	56	31	181	847
1982	455	244	22	664	76	53	27	156	820
1983	458	235	26	655	79	47	31	157	812
1984	453	236	26	676	58	45	33	136	812
1985	434	247	24	666	76	48	33	157	823
1986	444	259	18	672	75	30	27	132	804
1987	440	239	13	659	87	30	24	141	800
1988	460	260	24	683	97	35	38	170	853
1989	452	257	23	687	99	38	32	169	856
1990	459	258	22	679	92	31	30	153	832
1991	497	272	29	680	85	33	28	146	826
1992	438	263	19	679	90	28	25	143	822
1993	448	238	6	682	75	30	18	123	805
1994	414	250	7	659	55	28	20	103	762
1995	446	254	0	664	87	31	24	142	806
1996	455	217	9	628	87	29	19	135	763
1997	463	221	0	640	39	31	15	85	725
1998	434	231	0	643	0	18	10	28	671
1999	422	238	5	632	6	26	6	38	670
2000	350	214	0	562	0	0	0	0	562
2001	0	0	0	0	0	0	0	0	0
2002	322	223	0	540	0	18	6	24	564
2003	358	217	0	557	3	16	8	27	584
2004	399	212	0	551	0	14	9	23	574
2005	392	228	0	582	0	12	9	21	603
Averages									
1971-04	432	223	19	636	60	34	25	120	752
1995-04	365	203	1	542	22	18	10	50	592
2000-04	286	173	0	442	1	10	5	15	457

[a] Number of permit holders which made at least one delivery.

[b] Since 1984 the subtotal for the Lower Yukon Area was the unique number of permits fished. Before 1984, the subtotals are additive for Districts 1, 2, and 3. Some individual fishermen in the Lower Yukon Area may have operated in more than one district during the year.

Appendix A8.–Alaskan and Canadian total utilization of Yukon River Chinook and fall chum salmon, 1961-2005.

	Chinook			Fall Chum		
Year	Canada [a]	Alaska [b, c]	Total	Canada [a]	Alaska [b, c]	Total
1961	13,246	141,152	154,398	9,076	144,233	153,309
1962	13,937	105,844	119,781	9,436	140,401	149,837
1963	10,077	141,910	151,987	27,696	99,031 [d]	126,727
1964	7,408	109,818	117,226	12,187	128,707	140,894
1965	5,380	134,706	140,086	11,789	135,600	147,389
1966	4,452	104,887	109,339	13,192	122,548	135,740
1967	5,150	146,104	151,254	16,961	107,018	123,979
1968	5,042	118,632	123,674	11,633	97,552	109,185
1969	2,624	105,027	107,651	7,776	183,373	191,149
1970	4,663	93,019	97,682	3,711	265,096	268,807
1971	6,447	136,191	142,638	16,911	246,756	263,667
1972	5,729	113,098	118,827	7,532	188,178	195,710
1973	4,522	99,670	104,192	10,135	285,760	295,895
1974	5,631	118,053	123,684	11,646	383,552	395,198
1975	6,000	76,883	82,883	20,600	361,600	382,200
1976	5,025	105,582	110,607	5,200	228,717	233,917
1977	7,527	114,494	122,021	12,479	340,757	353,236
1978	5,881	129,988	135,869	9,566	331,250	340,816
1979	10,375	159,232	169,607	22,084	593,293	615,377
1980	22,846	197,665	220,511	22,218	466,087	488,305
1981	18,109	188,477	206,586	22,281	654,976	677,257
1982	17,208	152,808	170,016	16,091	357,084	373,175
1983	18,952	198,436	217,388	29,490	495,526	525,016
1984	16,795	162,683	179,478	29,267	383,055	412,322
1985	19,301	187,327	206,628	41,265	474,216	515,481
1986	20,364	146,004	166,368	14,543	303,485	318,028
1987	17,614	188,386	206,000	44,480	361,663 [d]	406,143
1988	21,427	148,421	169,848	33,565	319,677	353,242
1989	17,944	157,606	175,550	23,020	518,157	541,177
1990	19,227	149,433	168,660	33,622	316,478	350,100
1991	20,607	154,651	175,258	35,418	403,678	439,096
1992	17,903	168,191	186,094	20,815	128,031 [f]	148,846
1993	16,611	163,078	179,689	14,090	76,925 [d]	91,015
1994	21,198	172,315	193,513	38,008	131,217	169,225
1995	20,884	177,663	198,547	45,600	415,547	461,147
1996	19,612	138,562	158,174	24,354	236,569	260,923
1997	16,528	174,625	191,153	15,580	154,479	170,059
1998	5,937	99,369	105,306	7,901	62,869	70,770
1999	12,468	124,315	136,783	19,506	110,369	129,875
2000	4,879	45,308	50,187	9,236	19,307	28,543
2001	10,139	53,738	63,877	9,512	35,154 [d]	44,666
2002	9,257	68,112	77,369	8,018	19,393	27,411
2003	9,616	98,696	108,312	11,355	68,174	79,529
2004	11,238	111,557	122,795	9,750	66,165	75,915
2005 [g]	10,680	85,166	95,846	18,324	269,327	287,651
Average						
1961-04	12,177	133,675	145,852	18,604	249,130	272,195
1995-04	12,056	109,195	121,250	16,081	118,803	134,884
2000-04	9,026	75,482	84,508	9,574	41,639	51,213

Note: Canadian managers do not refer to chum as fall chum.

[a] Catches in number of salmon. Includes commercial, Aboriginal, domestic, and sport catches combined. Catch in number of salmon. Includes estimated number of salmon harvested for the commercial production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

[c] Commercial, subsistence, personal-use, and sport catches combined.

[d] Commercial fishery did not operate within the Alaskan portion of the drainage.

[f] Commercial fishery operated only in District 6, the Tanana River.

[g] Data are preliminary.

Appendix A9.–Canadian catch of Yukon River Chinook salmon, 1961-2005.

	Mainstem Yukon River Harvest							Porcupine River Aboriginal Fishery	Total Canadian
Year	Commercial	Domestic	Aboriginal Fishery	Sport [a]	Test Fishery	Combined Non-Commercial	Total	Harvest	Harvest
1961	3,446		9,300			9,300	12,746	500	13,246
1962	4,037		9,300			9,300	13,337	600	13,937
1963	2,283		7,750			7,750	10,033	44	10,077
1964	3,208		4,124			4,124	7,332	76	7,408
1965	2,265		3,021			3,021	5,286	94	5,380
1966	1,942		2,445			2,445	4,387	65	4,452
1967	2,187		2,920			2,920	5,107	43	5,150
1968	2,212		2,800			2,800	5,012	30	5,042
1969	1,640		957			957	2,597	27	2,624
1970	2,611		2,044			2,044	4,655	8	4,663
1971	3,178		3,260			3,260	6,438	9	6,447
1972	1,769		3,960			3,960	5,729		5,729
1973	2,199		2,319			2,319	4,518	4	4,522
1974	1,808	406	3,342			3,748	5,556	75	5,631
1975	3,000	400	2,500			2,900	5,900	100	6,000
1976	3,500	500	1,000			1,500	5,000	25	5,025
1977	4,720	531	2,247			2,778	7,498	29	7,527
1978	2,975	421	2,485			2,906	5,881		5,881
1979	6,175	1,200	3,000			4,200	10,375		10,375
1980	9,500	3,500	7,546	300		11,346	20,846	2000	22,846
1981	8,593	237	8,879	300		9,416	18,009	100	18,109
1982	8,640	435	7,433	300		8,168	16,808	400	17,208
1983	13,027	400	5,025	300		5,725	18,752	200	18,952
1984	9,885	260	5,850	300		6,410	16,295	500	16,795
1985	12,573	478	5,800	300		6,578	19,151	150	19,301
1986	10,797	342	8,625	300		9,267	20,064	300	20,364
1987	10,864	330	6,069	300		6,699	17,563	51	17,614
1988	13,217	282	7,178	650		8,110	21,327	100	21,427
1989	9,789	400	6,930	300		7,630	17,419	525	17,944
1990	11,324	247	7,109	300		7,656	18,980	247	19,227
1991	10,906	227	9,011	300		9,538	20,444	163	20,607
1992	10,877	277	6,349	300		6,926	17,803	100	17,903
1993	10,350	243	5,576	300		6,119	16,469	142	16,611
1994	12,028	373	8,069	300		8,742	20,770	428	21,198
1995	11,146	300	7,942	700		8,942	20,088	796	20,884
1996	10,164	141	8,451	790		9,382	19,546	66	19,612
1997	5,311	288	8,888	1,230		10,406	15,717	811	16,528
1998	390	24	4,687	0	737	5,448	5,838	99	5,937
1999	3,160	213	8,804	177		9,194	12,354	114	12,468
2000	[b]	[b]	4,068	[b]	761	4,829	4,829	50	4,879
2001	1,351	89	7,416	146	767	8,418	9,769	370	10,139
2002	708	59	7,138	128	1,036	8,361	9,069	188	9,257
2003	2,672	115	6,121	275	263	6,774	9,446	173	9,619
2004	3,785	88	6,483	423	167	7,161	10,946	292	11,238
2005	4,066	65	6,376	173	0	6,614	10,680	394	11,074
Average									
1961-04	5,958	427	5,550	363	622	6,124	11,947	246	12,177
1995-04	4,299	146	7,000	430	622	7,892	11,760	296	12,056
2000-04	2,129	88	6,245	243	599	7,109	8,812	215	9,026

[a] Sport fish harvest unknown before 1980.

[b] A test fishery and aboriginal fisheries took place but all other fisheries were closed.

Appendix A10.–Canadian catch of Yukon River fall chum salmon, 1961-2005.

	Mainstem Yukon River Harvest						Porcupine River Aboriginal Fishery	Total Canadian
Year	Commercial	Domestic	Test	Aboriginal Fishery	Combined Non-Commercial	Total	Harvest	Harvest
1961	3,276			3,800	3,800	7,076	2,000	9,076
1962	936			6,500	6,500	7,436	2,000	9,436
1963	2,196			5,500	5,500	7,696	20,000	27,696
1964	1,929			4,200	4,200	6,129	6,058	12,187
1965	2,071			2,183	2,183	4,254	7,535	11,789
1966	3,157			1,430	1,430	4,587	8,605	13,192
1967	3,343			1,850	1,850	5,193	11,768	16,961
1968	453			1,180	1,180	1,633	10,000	11,633
1969	2,279			2,120	2,120	4,399	3,377	7,776
1970	2,479			612	612	3,091	620	3,711
1971	1,761			150	150	1,911	15,000	16,911
1972	2,532				0	2,532	5,000	7,532
1973	2,806			1,129	1,129	3,935	6,200	10,135
1974	2,544	466		1,636	2,102	4,646	7,000	11,646
1975	2,500	4,600		2,500	7,100	9,600	11,000	20,600
1976	1,000	1,000		100	1,100	2,100	3,100	5,200
1977	3,990	1,499		1,430	2,929	6,919	5,560	12,479
1978	3,356	728		482	1,210	4,566	5,000	9,566
1979	9,084	2,000		11,000	13,000	22,084		22,084
1980	9,000	4,000		3,218	7,218	16,218	6,000	22,218
1981	15,260	1,611		2,410	4,021	19,281	3,000	22,281
1982	11,312	683		3,096	3,779	15,091	1,000	16,091
1983	25,990	300		1,200	1,500	27,490	2,000	29,490
1984	22,932	535		1,800	2,335	25,267	4,000	29,267
1985	35,746	279		1,740	2,019	37,765	3,500	41,265
1986	11,464	222		2,200	2,422	13,886	657	14,543
1987	40,591	132		3,622	3,754	44,345	135	44,480
1988	30,263	349		1,882	2,231	32,494	1,071	33,565
1989	17,549	100		2,462	2,562	20,111	2,909	23,020
1990	27,537	0		3,675	3,675	31,212	2,410	33,622
1991	31,404	0		2,438	2,438	33,842	1,576	35,418
1992	18,576	0		304	304	18,880	1,935	20,815
1993	7,762	0		4,660	4,660	12,422	1,668	14,090
1994	30,035	0		5,319	5,319	35,354	2,654	38,008
1995	39,012	0		1,099	1,099	40,111	5,489	45,600
1996	20,069	0		1,260	1,260	21,329	3,025	24,354
1997	8,068	0		1,218	1,218	9,286	6,294	15,580
1998 [b]				1,742	1,742	1,742	6,159	7,901
1999	10,402	0		3,104	3,104	13,506	6,000	19,506
2000	1,319	0		2,917	2,917	4,236	5,000	9,236
2001	2,198	3	1 [a]	2,717	2,720	4,918	4,594	9,512
2002	3,065	0	2,756 [a]	3,093	3,093	6,158	1,860	8,018
2003	9,030	0	990 [a]	1,943	1,943	10,973	382	11,355
2004	7,365	0	995 [a]	2,180	2,180	9,545	205	9,750
2005	11,931	0	0	1,800	1,800	13,731	4,593	18,324
Average								
1961-04	11,340	617	1,186	2,537	2,900	13,983	4,729	18,604
1995-04	11,170	0	1,186	2,127	2,128	12,180	3,901	16,081
2000-04	4,595	1	1,186	2,570	2,571	7,166	2,408	9,574

[a] The chum test fishery is a live-release test fishery.

[b] A test fishery and aboriginal fisheries took place but all other fisheries were closed.

Appendix A11.–Chinook salmon aerial survey indices for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1961-present.[a]

	Andreafsky River			Nulato River			
Year	East Fork	West Fork	Anvik River	North Fork	South Fork	Both Forks	Gisasa River
1961	1,003		1,226	376 [b]	167		266 [b]
1962	675 [b]	762					
1963							
1964	867	705					
1965		344	650				
1966	361	303	638				
1967		276	336				
1968	380	383	310				
1969	274	231	296				
1970	665	574	368				
1971	1,904	1,682					
1972	798	582	1,198				
1973	825	788	613				
1974		285	471	55	23		161
1975	993	301	730	123	81		385
1976	818	643	1,053	471	177		332
1977	2,008	1,499	1,371	286	201		255
1978	2,487	1,062	1,324	498	422		
1979	1,180	1,134	1,484	1,093	414		484
1980	958	1,500	1,330	954	369		951
1981	2,146	231	807		791		
1982	1,274	851					421
1983			653	526	480		572
1984	1,573	1,993	641				
1985	1,617	2,248	1,051	1,600	1,180		735
1986	1,954	3,158	1,118	1,452	1,522		1,346
1987	1,608	3,281	1,174	1,145	493		731
1988	1,020	1,448	1,805	1,061	714		797
1989	1,399	1,089	442				
1990	2,503	1,545	2,347	568	430		884
1991	1,938	2,544	875	767	1,253		1,690
1992	1,030	2,002	1,536	348	231		910
1993	5,855	2,765	1,720	1,844	1,181		1,573
1994	300	213		843	952		2,775
1995	1,635	1,108	1,996	968	681		410
1996		624	839		100		
1997	1,140	1,510	3,979				144
1998	1,027	1,249	709	507	546		889
1999	[b]	[b]	[b]	[b]	[b]	[b]	[b]
2000	1,018	427	1,721	[b]	[b]		[b]
2001	1,065	570	1,420	1,116	768		1,298
2002	1,447	917	1,713	687	897		506
2003	[b]	1,578	[b]				
2004	2,879	1,317	3,681				731
2005	1,492	1,715	2,421			553	950
SEG [c]	960-1,700	640-1,600	1,100-1,700			940-1,900	420-1,100

[a] Aerial survey counts are peak counts only. Survey rating was fair or good unless otherwise noted.

[b] Incomplete, poor timing and/or poor survey conditions resulting in minimal or inaccurate counts.

[c] Sustainable Escapement Goal.

Appendix A12.–Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1986-2005.

	Andreafsky River		Nulato River Tower	Gisasa River Weir		Chena River w/corrected percent females		Salcha River w/corrected percent females	
Year	No. Fish	% Fem.	No. Fish	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	% Fem.
1986	1,530	23.3 [a]				9,065	20.0 [d]		35.8
1987	2,011	56.1 [a]				6,404	43.8 [d]	4,771	47.0 [d]
1988	1,339	38.7 [a]				3,346	46.0 [d]	4,562	36.6 [d]
1989		13.6				2,666	38.0 [d]	3,294	46.8 [d]
1990		41.6				5,603	35.0 [d]	10,728	35.4 [d]
1991		33.9				3,025	31.5 [d]	5,608	34.0 [d]
1992		21.2				5,230	27.8 [d]	7,862	27.3 [d]
1993		29.9				12,241	11.9 [a]	10,007	24.2 [a]
1994	7,801	35.5 [b, c]	1,795 [c]	2,888	[c]	11,877	34.9 [a]	18,399	35.2 [a]
1995	5,841	43.7 [b]	1,412	4,023	46.0	9,680	50.3	13,643	42.2 [a]
1996	2,955	41.9 [b]	756	1,952	19.5	7,153	27.0	7,570	26.3
1997	3,186	36.8 [b]	4,766	3,764	26.0	13,390	17.0 [a]	18,514	36.3 [a]
1998	4,011	29.0 [b]	1,536	2,356	16.2	4,745	30.5 [a]	5,027	22.4 [a]
1999	3,347	28.6 [b]	1,932	2,631	26.4	6,485	47.0 [a]	9,198	38.8 [a]
2000	1,344	54.3 [b]	908	2,089	34.4	4,694	20.0 [d]	4,595	29.9 [a]
2001		[c]	[c]	3,052	49.2 [c]	9,696	32.4 [a]	13,328	27.9 [a]
2002	4,896	21.1 [b]	2,696	1,931	20.7	6,967	27.0 [d]	4,644	34.8 [c]
2003	4,383	45.3 [b]	1,716 [c]	1,873	38.1	8,739	34.0 [c]	11,758	31.8 [c]
2004	7,912	37.3	[h]	1,774	30.1	9,645	47.0	15,761	47.0
2005	2,239	50.2	[h]	3,111	34.0		[c]	5,988	54.3
BEG [f]						2,800-5,700		3,300-6,500	

[a] Tower counts.

[b] Weir counts.

[c] Incomplete count because of late installation, early removal of project or inoperable.

[d] Mark-recapture population estimate.

[e] Data are preliminary.

[f] Biological Escapement Goals (BEG) established by the Alaska Board of Fisheries, Jan. 2001.

[g] Project did not operate in 2004-2005.

Appendix A13.–Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-2005.

										Whitehorse Fishway		Canadian Mainstem		
Year	Tincup Creek [a]	Tatchun Creek [b]	Little Salmon River [a]	Big Salmon River [a, c]	Nisutlin River [a, d]	Ross River [a, f]	Wolf River [a, g]	Blind Creek	Chandindu River	Count	Percent Hatchery Contribution	Border Passage Estimate	Harvest	Spawning Escapement Estimate [j]
1961										1,068	0			
1962										1,500	0			
1963										483	0			
1964										595	0			
1965										903	0			
1966		7 [k]								563	0			
1967										533	0			
1968			173 [k]	857 [k]	407 [k]	104 [k]				414	0			
1969			120	286	105					334	0			
1970		100		670	615		71 [k]			625	0			
1971		130	275	275	650		750			856	0			
1972		80	126	415	237		13			391	0			
1973		99	27 [k]	75 [k]	36 [k]					224	0			
1974		192		70 [k]	48 [k]					273	0			
1975		175		153 [k]	249		40 [k]			313	0			
1976		52		86 [k]	102					121	0			
1977		150	408	316 [k]	77					277	0			
1978		200	330	524	375					725	0			
1979		150	489 [k]	632	713		183 [k]			1,184	0			
1980		222	286 [k]	1,436	975		377			1,383	0			
1981		133	670	2,411	1,626	949	395			1,555	0			
1982		73	403	758	578	155	104			473	0	36,598	16,808	19,790
1983	100	264	101 [k]	540	701	43 [k, n]	95			905	0	47,741	18,752	28,989
1984	150	153	434	1,044	832	151 [k]	124			1,042	0	43,911	16,295	27,616
1985	210	190	255	801	409	23 [k]	110			508	0	29,881	19,151	10,730
1986	228	155	54 [k]	745	459 [k]	72 [p]	109			557	0	36,479	20,064	16,415
1987	100	159	468	891	183	180 [k]	35			327	0	30,823	17,563	13,260
1988	204	152	368	765	267	242	66			405	16	44,445	21,327	23,118
1989	88	100	862	1,662	695	433 [p]	146			549	19	42,620	17,419	25,201
1990	83	643	665	1,806	652	457 [k]	188			1,407	24	56,679	18,980	37,699 [q]
1991			326	1,040		250	201 [r]			1,266 [h]	51 [h]	41,187	20,444	20,743 [q]
1992	73	106	494	617	241	423	110 [r]			758 [h]	84 [h]	43,185	17,803	25,382 [q]
1993		183	184	572	339	400	168 [r]			668 [h]	73 [h]	45,027	16,469	28,558 [q]
1994	101 [k]	477	726	1,764	389	506	393 [r]			1,577 [h]	54 [h]	46,680	20,770	25,910 [q]
1995	121	397	781	1,314	274	253 [k]	229 [r]			2,103	57	52,353	20,088	32,265 [q]
1996	150	423	1,150	2,565	719	102 [k]	705 [r]			2,958	35	47,955	19,546	28,409 [q]
1997	193	1,198	1,025	1,345	277		322 [r]	957		2,084	24	53,400	15,717	37,683 [q]
1998	53	405	361	523	145		66	373	132	777	95	22,588	5,838	16,750 [q]
1999		252	495	353	330		131	892	239	1,118	74	23,716 [v]	12,354	11,362 [q]

-continued-

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Year	Tincup Creek [a]	Tatchun Creek [b]	Little Salmon River [a]	Big Salmon River [a, c]	Nisutlin River [a, d]	Ross River [a, f]	Wolf River [a, g]	Blind Creek	Chandindu River	Whitehorse Fishway Count	Whitehorse Fishway Percent Hatchery Contribution	Canadian Mainstem Border Passage Estimate	Canadian Mainstem Harvest	Canadian Mainstem Spawning Escapement Estimate [j]
2000	19 [t]	277 [aa]	46	113	20		32		4 [u]	677	69	16,173 [v]	4,829	11,344 [q]
2001	39 [t]		1,035	1,020	481		154		129 [x]	988	36	52,207 [v]	9,769	42,438 [q]
2002			526	1,149	280		84		[y]	605	39	49,214 [v]	9,069	40,145
2003			1,658	3,075	687		292	1115	185 [z]	1,443	70	56,929 [v]	9,443	47,486
2004			1,140	762	330		226	792		1,989	76	48,111 [v]	10,946	37,165
2005 [s]			1519	952	807	363	260	525		2,632	57	42,245	10,680	31,565
Escapement Objective														28,000 [q]
Averages														
1961-04	120	235	499	904	431	279	197	826	138	898	20	42,083	15,841	26,455
1995-04	96	492	822	1,222	354	178	224	811	185	1,474	58	42,265	11,760	30,505
2000-04 [v]	29	277	881	1,224	360		158	525	138	1,140	58	44,527	8,811	35,716

[a] Data obtained by aerial survey unless otherwise noted. Only peak counts are listed. Survey rating is fair to good, unless otherwise noted.
[b] All foot surveys prior to 1997 except 1978 (boat survey) and 1986 (aerial survey).
[c] For 1968, 1970, and 1971 counts are from mainstem Big Salmon River. For all other years counts are from the mainstem Big Salmon River between Big Salmon Lake and the vicinity of Souch Creek.
[d] One Hundred Mile Creek to Sidney Creek.
[f] Big Timber Creek to Lewis Lake.
[g] Wolf Lake to Red River.
[h] Counts and estimated percentages may be slightly exaggerated. In some or all of these years a number of adipose-clipped fish ascended the fishway, and were counted more than once. These fish would have been released into the fishway as fry between 1989 and 1994, inclusive.
[j] Estimated total spawning escapement excluding Porcupine River (estimated border escapement minus the Canandian catch).
[k] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.
estimated spawning escapement from the DFO tagging study for years 1983, and 1985-1989.
[n] Information on area surveyed is unavailable.
[p] Counts are for Big Timber Creek to Sheldon Lake.
[q] Interim escapement objective. Stabilization escapement objective for years 1990-1995 was 18,000 salmon. Rebuilding step escapement objective for 2002 is 25,000 salmon for subsistence and 28,000 salmon for commercial.
[r] Counts are for Wolf Lake to Fish Lake outlet.
[s] Data are preliminary.
[t] Foot survey.
[u] High water delayed project installation, therefore, counts are incomplete.
[v] The 1999 to 2004 chum border estimates were revised using a stratified "SPAS" analyses.
[x] Conventional weir July 01-September 08, but was breached from July 31-August 7.
[y] RBW tested for three weeks.
[z] Combination RBW and conduit weir tested and operational from July 10--30.
[aa] Flood conditions caused early terminatino of this program.

Appendix A14.–Summer chum salmon ground based escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1973-2005.[a]

	East Fork Andreafsky R.		Anvik R. Sonar		Kaltag Crk. Tower	Nulato R. Tower		Gisasa R. Weir		Clear Crk. Weir		Chena R. Tower	Salcha R. Tower
Year	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	No. Fish
1980			492,676	60.7									
1981	147,312	[a]	1,486,182	54.7									
1982	181,352	64.6 [a]	444,581	69.4									
1983	110,608	57.4 [a]	362,912	56.5									
1984	70,125	50.7 [a]	891,028	60.9									
1985		58.1 [d]	1,080,243	55.8									
1986	167,614	55.4 [b]	1,189,602	57.8									
1987	45,221	58.6 [b]	455,876	65.1			44.9						
1988	68,937	49.3 [b]	1,125,449	66.1			60.9						
1989			636,906	65.6									
1990			403,627	51.3									
1991			847,772	57.9									
1992			775,626	56.6									
1993		48.6	517,409	52.0								5,400	5,809
1994	200,981	65.2 [c, d]	1,124,689	59.1	47,295	148,762	47.7 [d]	51,116	[d]			9,984	39,450
1995	172,148	48.9 [c]	1,339,418	40.1	77,193	236,890	55.6	136,886	45.7	116,735	62.1	3,519 [d]	30,784
1996	108,450	51.4 [c]	933,240	47.3	51,269	129,694	51.9	157,589	49.3	100,912	59.0	12,810 [d]	74,827
1997	51,139	[c]	609,118	53.6	48,018	157,975	51.9	31,800		76,454		9,439 [d]	35,741
1998	67,591	57.3 [c]	471,865	55.9	8,113	49,140	64.2	18,228	50.8	212	[d]	5,901 [d]	17,289
1999	32,229	56.4 [c]	437,631	58.1	5,300	30,076	63.0	9,920	53.1	11,283	[d]	9,165 [d]	23,221
2000	22,918	48.2 [c]	196,349	61.6	6,727	24,308	62.6	14,410	49.9	19,376	43.6	3,515	20,516
2001		52.0 [d]	224,058	55.3	[d]		[d]	17,936	50.3 [d]	3,674	32.4	4,773 [d]	14,900
2002 [e]	45,019	52.9	462,101	60.2	13,583	72,232	27.0	32,943	47.7	13,150	51.6	1,021 [d]	20,837 [d]
2003	22,603	44.8	251,358	55.3	3,056 [d]	17,814	[d]	24,379	45.9	5,230	40.5	573 [d]	[d]
2004	62,730	51.4	365,691	53.3	5,247		[h]	37,851	44.9	15,661	44.5	15,162 [e]	47,861
2005	20,127	44.0	525,391	48.0	22,093		[h]	172,259	46.3	26,420	45.8	[d]	193,085
BEG [f]	65-130		350-700										

[a] Sonar count.
[b] Tower count.
[c] Weir count.
[d] Incomplete count caused by late installation and/or early removal of project, or high water events.
[e] Data are preliminary.
[f] Biological Escapement Goals (in thousands of fish) established by the Alaska Board of Fisheries, Jan. 2001.
[h] Project did not operate in 2004-2005.

Appendix A15.–Fall chum salmon abundance estimates or escapement estimates for selected spawning areas in Alaskan and Canadian portions of the Yukon River Drainage, 1971-2005.[a]

	Alaska							
	Tanana River Drainage					Upper Yukon River Drainage		
Year	Toklat River [b]	Kantishna River Abundance Estimate [c]	Delta River [d]	Bluff Cabin Slough [e]	Upper Tanana River Abundance Estimate [f]	Rampart Rapids Abundance Estimate [g]	Chandalar River [h]	Sheenjek River [j]
1971								
1972			5,384					
1973			10,469					
1974	41,798		5,915					89,966 [x]
1975	92,265		3,734 [y]					173,371 [x]
1976	52,891		6,312 [y]					26,354 [x]
1977	34,887		16,876 [y]					45,544 [x]
1978	37,001		11,136					32,449 [x]
1979	158,336		8,355					91,372 [x]
1980	26,346 [ah]		5,137	3,190 [m]				28,933 [x]
1981	15,623		23,508	6,120 [m]				74,560
1982	3,624		4,235	1,156				31,421
1983	21,869		7,705	12,715				49,392
1984	16,758		12,411	4,017				27,130
1985	22,750		17,276 [y]	2,655 [m]				152,768
1986	17,976		6,703 [y]	3,458			59,313	84,207 [ad]
1987	22,117		21,180	9,395			52,416	153,267 [ad]
1988	13,436		18,024	4,481 [m]			33,619	45,206 [ad]
1989	30,421		21,342 [y]	5,386 [m]			69,161	99,116 [ad]
1990	34,739		8,992 [y]	1,632			78,631	77,750 [ad]
1991	13,347		32,905 [y]	7,198				86,496 [ag]
1992	14,070		8,893 [y]	3,615 [m]				78,808
1993	27,838		19,857	5,550 [m]				42,922
1994	76,057		23,777 [y]	2,277 [m]				150,565
1995	54,513 [ah]		20,587	19,460	268,173		280,999	241,855
1996	18,264		19,758 [y]	7,074 [y]	134,563	654,296	208,170	246,889
1997	14,511		7,705 [y]	5,707 [y]	71,661	369,547	199,874	80,423 [ak]
1998	15,605		7,804 [y]	3,549 [y]	62,384	194,963	75,811	33,058
1999	4,551	27,199	16,534 [y]	7,037 [y]	97,843	189,741	88,662	14,229
2000	8,911	21,450	3,001 [y]	1,595	34,844	[an]	65,894	30,084 [ao]
2001	6,007 [ap]	22,992	8,103 [y]	1,808 [m]	96,556 [aq]	201,766	110,971	53,932
2002	28,519	56,719	11,992 [y]	3,116	109,970	196,186	89,850	31,642
2003	21,492	87,359	22,582 [y]	10,600 [m]	193,418	485,102	214,416	44,047
2004	35,480	76,163	25,073 [y]	10,270 [m]	123,879	618,597 [ar]	136,706	37,878
2005 [as]	17,779 [ah]	96,926	28,132	11,964 [m]	318,527	1,987,982	496,494	438,253
BEG [at]	15,000-33,000		6,000-13,000		46,000-103,000 [at]		74,000-152,000	50,000-104,000
Average								
1971-04	31,677	48,647	13,432	5,722	119,329	363,775	117,633	79,214
1995-04	20,785	48,647	14,314	7,022	119,329	363,775	147,135	81,404
2000-04	20,082	52,937	14,150	5,478	111,733	375,413	123,567	39,517

-continued-

Appendix A15.–Page 2 of 3.

	Canada							
						Canadian Mainstem		
Year	Fishing Branch River [k, m]	Mainstem Yukon River Index [m, n]	Koidern River [m]	Kluane River [m, p]	Teslin River [m, r]	Border Passage Estimate	Harvest	Spawning Escapement Estimate [s]
1971	312,800							
1972	35,125 [t]			198 [v, e]				
1973	15,989 [w]	383		2,500				
1974	31,525 [w]			400				
1975	353,282 [w]	7,671		362 [e]				
1976	36,584			20				
1977	88,400			3,555				
1978	40,800			0 [e]				
1979	119,898			4,640 [e]				
1980	55,268			3,150		39,130	16,218	22,912
1981	57,386 [z]			25,806		66,347	19,281	47,066 [ac]
1982	15,901	1,020 [aa]		5,378		47,049	15,091	31,958
1983	27,200	7,560		8,578 [e]		118,365	27,490	90,875
1984	15,150	2,800 [ab]	1,300	7,200	200	81,900	25,267	56,633 [ac]
1985	56,016 [w]	10,760	1,195	7,538	356	99,775	37,765	62,010
1986	31,723 [w]	825	14	16,686	213	101,826	13,886	87,940
1987	48,956 [w]	6,115	50	12,000		125,121	44,345	80,776
1988	23,597 [w]	1,550	0	6,950	140	69,280	32,494	36,786
1989	43,834 [w]	5,320	40	3,050	210 [v]	55,861	20,111	35,750
1990	35,000 [af]	3,651	1	4,683	739	82,947	31,212	51,735
1991	37,733 [w]	2,426	53	11,675	468	112,303	33,842	78,461
1992	22,517 [w]	4,438	4	3,339	450	67,962	18,880	49,082
1993	28,707 [w]	2,620	0	4,610	555	42,165	12,422	29,743
1994	65,247 [w]	1,429 [v]	20 [v]	10,734	209 [v]	133,712	35,354	98,358
1995	51,971 [w, aj]	4,701	0	16,456	633	198,203	40,111	158,092
1996	77,278 [w]	4,977		14,431	315	143,758	21,329	122,429
1997	26,959 [w]	2,189		3,350	207	94,725	9,286	85,439
1998	13,564 [w]	7,292		7,337	235	48,047	1,742	46,305
1999	12,904 [w]			5,136	19 [v]	72,188 [aw]	13,506	58,682
2000	5,053 [w]	933 [v]		1,442	204	57,978 [aw]	4,236	53,742
2001	21,669 [w]	2,453		4,884	5	38,769 [aw]	4,918	33,851
2002	13,563 [am]	973		7,147	64	104,853 [aw]	6,158	98,695
2003	29,519	7,982		39,347	390	153,656 [aw]	10,973	142,683
2004	20,274	3,440		18,982	167	163,625 [aw]	9,545	154,080
2005	121,413	16,425		34,600	585	451,477	13,731	437,746 [am]
EO [a]	50,000-120,000							>80,000
Average								
1971-04	55,041	3,896	223	7,926 #	289	92,782	20,218	72,563
1995-04	27,275	3,882	0	11,851 #	224	107,580	12,180	95,400
2000-04	18,016	3,156		14,360 #	166	103,776	7,166	96,610

-continued-

Note: Canadian managers refer to summer and fall chum salmon as chum salmon.

[a] Latest table revision February 10, 2006.

[b] Expanded total abundance estimates for upper Toklat River index area using stream life curve (SLC) developed with 1987-1993 data. Index area includes Geiger Creek, Sushana River, and mainstem floodplain sloughs from approximately 0.25 mile upstream of roadhouse.

[c] Fall chum salmon abundance estimate for the Kantishna and Toklat River drainages is based on a mark-recapture program. Tag deployment occurs at a fish wheel located near the mouth of the Kantishna River and recaptures are collected at four fish wheels; two located eight miles upstream of the mouth of the Toklat River (1999-2005) and one fish wheel on the Kantishna River (2000-2002) and two fish wheels in 2003-2005.

[d] Estimates are a total spawner abundance, using migratory time density curves and stream life data.

[e] Foot survey, unless otherwise indicated.

[f] Fall chum salmon abundance estimate for the upper Tanana River drainage is based on a mark-recapture program. Tag deployment occurs from a fish wheel (two fish wheels in 1995) located just upstream of the Kantishna River and recaptures are collected from one fish wheel (two fish wheels in 1995) located downstream from the village of Nenana.

[g] Fall chum salmon abundance estimate for the upper Yukon River drainage is based on a mark-recapture program. Tag deployment occurs at two fish wheels (one fish wheel in 2004) located at the "Rapids" and recaptures are collected from a fish wheel (two fish wheels in 1996 to 1999) located downstream from the village of Rampart.

[h] Side-scan sonar estimate for 1986-1990, split-beam sonar estimate 1995 to current.

[j] Side-scan sonar estimate beginning in 1981, split-beam sonar estimate 2002 to 2004, DIDSON sonar 2005.

[k] Located within the Canadian portion of the Porcupine River drainage. Total escapement estimated using weir to aerial survey expansion factor of 2.72, unless otherwise indicated.

[m] Aerial survey count, unless otherwise indicated.

[n] Tatchun Creek to Fort Selkirk.

[p] Duke River to end of spawning sloughs below Swede Johnston Creek.

[r] Boswell Creek area (5 km below to 5 km above confluence).

[s] Excludes Fishing Branch River escapement (estimated border passage minus Canadian removal).

[t] Weir installed Sept 22. Estimate consists of weir count of 17,190 after Sept 22, and tagging passage estimate of 17,935 before weir installation.

[v] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.

[w] Weir count.

[x] Total escapement estimate using sonar to aerial survey expansion factor of 2.22.

[y] Population estimate generated from replicate foot surveys and stream life data (area under the curve method).

[z] Initial aerial survey count doubled before applying the weir/aerial expansion factor of 2.72 since only half of the spawning area was surveyed.

[aa] Boat survey.

[ab] Total index area not surveyed. Survey included the mainstem Yukon River between Yukon Crossing to 30 km below Fort Selkirk.

[ac] Escapement estimate based on mark-recapture program unavailable. Estimate based on assumed average exploitation rate.

[ad] Expanded estimates for period approximating second week August through middle fourth week Sept, using Chandalar River run timing data.

[af] Weir not operated. Although only 7,541 chum salmon were counted on a single survey flown October 26, a population estimate of approximately 27,000 fish was made through date of survey, based upon historic average aerial-to-weir expansion of 28%. Actual population of spawners was reported by DFO as between 30,000-40,000 fish considering aerial survey timing.

[ag] Total abundance estimates are for the period approximating second week August through middle fourth week of September. Comparative escapement estimates before 1986 are considered more conservative; approximating the period end of August through mid week of September.

[ah] Minimal estimate because of late timing of ground surveys with respect to peak of spawning.

[aj] Incomplete count caused by late installation and/or early removal of project or high water events.

[ak] Data interploated due to high water from 29 August until 3 September 1997, during buildup to peak passage.

[am] Data are preliminary.

[an] Project ended early, population estimate through 19 August 2000 was 45,021 on average this represents 0.24 percent of the run.

[ao] Project ended early (September 12) because of low water.

[ap] Minimal estimate because Sushana River was breached by the main channel and uncountable.

[aq] Low numbers of tags deployed and recovered resulted in an estimate with an extremely large confidence interval (95% CI +/- 41,072).

[ar] Preliminary estimate for 2004 was 618,597 fall chum salmon with a high standard error (SE 60,714).

[as] Biological Escapement Goal (BEG) ranges recommended to the Board of Fisheries 2001.

[at] The BEG for the Tanana River as a whole is 61,000 to 136,000. However it includes the Toklat plus and the Upper Tanana which was broke out for comparison to the upper Tanana River abundance estimates.

[av] Escapement Objective (EO) based on US/Canada Treaty Obligations, some years stablization or rebuilding goals are applied.

[aw] 1999 to 2004 border passage estimates were revised using a stratified "SPAS" analysis.

Appendix A16.–Coho salmon passage estimates or escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River Drainage, 1972-2005.[a, b]

Year	East Fork Andreafsky River [c]	Yukon River Mainstem Sonar Estimate [d]	Kantishna River Drainage: Geiger Creek [f]	Nenana River Drainage: Lost Slough	Nenana River Drainage: Nenana Mainstem [g]	Nenana River Drainage: Wood Creek	Nenana River Drainage: Seventeen Mile Slough	Delta Clearwater River [h]	Delta Clearwater River Tributaries [j]	Clearwater Lake and Outlet	Richardson Clearwater River [k]	Year
1972								632		417	454 [m]	1972
1973								3,322		551	375	1973
1974				1,388			27	3,954 [m]		560	652	1974
1975				943			956	5,100		1,575 [n]	4 [m]	1975
1976			25 [k, m]	118			281	1,920		1,500 [n]	80 [m]	1976
1977			60 [k]	524 [k]		310 [f]	1,167	4,793		730 [n]	327	1977
1978				350		300 [f]	466	4,798		570 [n]		1978
1979				227			1,987	8,970		1,015 [n]	372	1979
1980			3 [k, m]	499 [k]		1,603 [f]	592	3,946		1,545 [n]	611	1980
1981	1,657 [k]			274		849 [c, p]	1,005	8,563 [r]		459 [k]	550	1981
1982			81			1,436 [c, p]		8,365 [r]				1982
1983			42	766		1,042 [c]	103	8,019 [r]		253	88	1983
1984			20 [k, m]	2,677		8,826 [c]		11,061		1,368	428	1984
1985			42 [k, m]	1,584		4,470 [c]	2,081	6,842		750		1985
1986			5	794		1,664 [c]	218 [n]	10,857		1,800	146 [m]	1986
1987			1,175	2,511		2,387 [c]	3,802	22,300		4,225 [n]		1987
1988	1,913 [s]		159	348		2,046 [c]		21,600		825 [n]		1988
1989			155 [k]			412 [c]	824 [k]	12,600		1,600 [n]	483	1989
1990			211	688	1,308		15 [k]	8,325		2,375 [n]		1990
1991			427 [k]	564	447		52	23,900		3,150 [n]		1991
1992			77 [k]	372			490	3,963		229 [n]	500	1992
1993			138	484	419	666 [c, t]	581	10,875		3,525 [n]		1993
1994			410 [c, u]	944	1,648	1,317 [c, v]	2,909	62,675	17,565	3,425 [n]	5,800	1994
1995	10,901	100,664	142 [c, w]	4,169	2,218	500 [c]	2,972 [k]	20,100	6,283	3,625 [n]		1995
1996	8,037		233 [c]	2,040	2,171	201 [k, m]	3,666 [n]	14,075	3,300	1,125 [m]		1996
1997	9,472	105,956	274	1,524 [x]	1,446	[z]	1,996	11,525	2,375	2,775 [n]		1997
1998	7,193	129,076	157	1,360 [m]	2,771 [m]	[z]	1,413 [y]	11,100	2,775	2,775 [n]		1998
1999	2,963	60,886	29	1,002 [m]	745 [m]	[z]	662 [m]	10,975	2,799			1999
2000	8,451	169,392	142	55 [k, m]	68 [k, m]	[z]	879 [k, m]	9,225	2,364	1,025 [n]	2,175	2000
2001	15,896	132,283	578 [k]	242	859	699	3,753	46,875	12,013	4,425 [n]	1,531	2001
2002	3,577	117,908	744	0	328	935	1,910	38,625	10,442	5,900	874	
2003	8,231	265,119	973	85	658	3,055	4,535	102,800	27,791	8,800	6,232	
2004 [aa]	11,146	199,884	583	220	450	840	3,370	37,550	10,551	2,925	8,626	
SEG [ab]								5,200-17,000 [ab]				
Average 1972-2004	8,587	142,352	265	922	1,110	1,678	1,525	16,977	8,933	2,123	1,515	

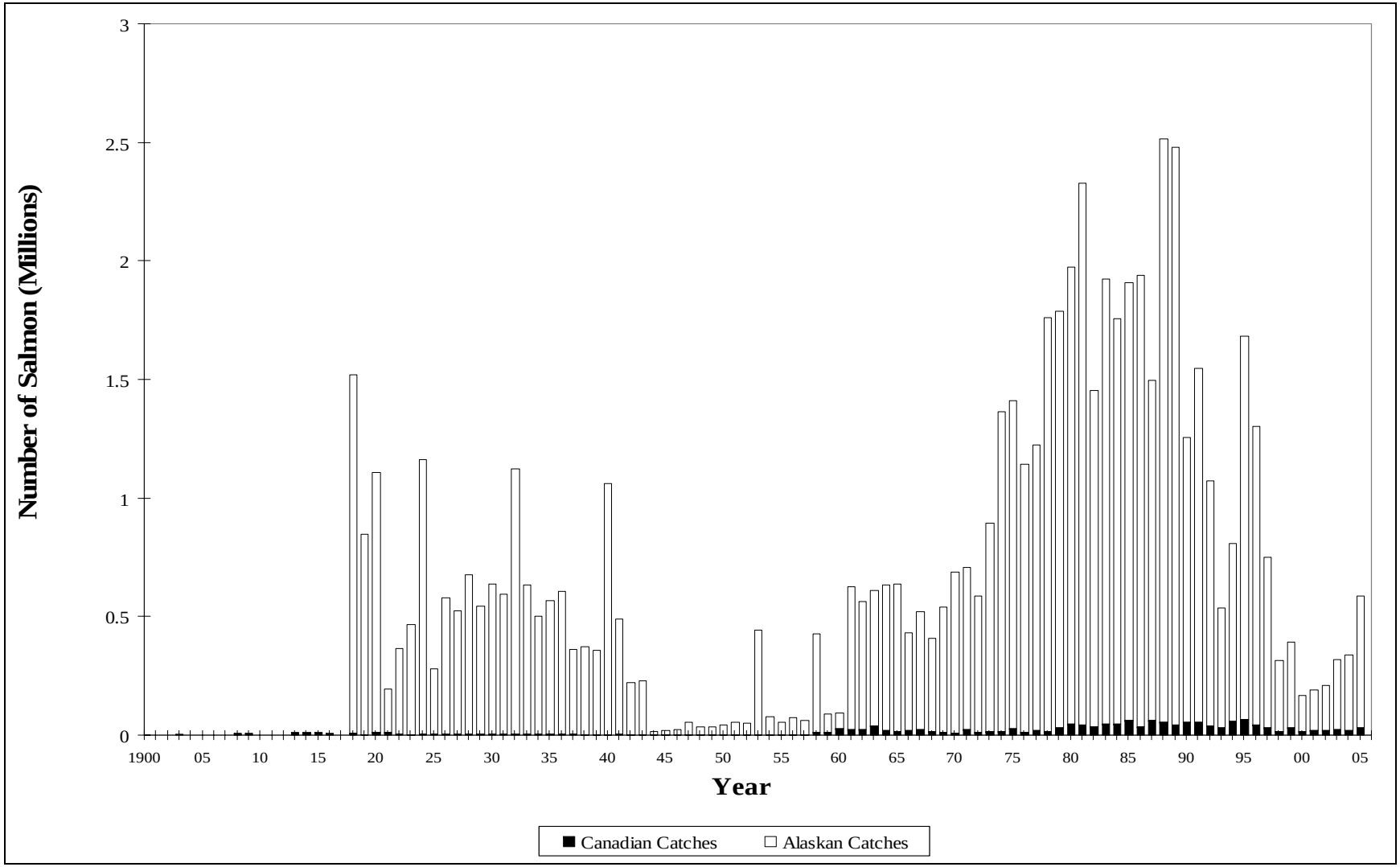
-continued-

[a] Latest table revision February 11, 2005.
[b] Only peak counts presented. Survey rating is fair to good, unless otherwise noted.
[c] Weir count, unless otherwise indicated.
[d] Passage estimates for coho salmon are incomplete. The sonar project is terminated prior to the end of the coho salmon run.
[f] Foot survey, usless otherwise indicated.
[g] Index area includes mainstem Nenana River between confluence's of Lost Slough and Teklanika River.
[h] Boat survey counts of index area (lower 17.5 river miles), unless otherwise indicated.
[j] Helicopter surveys counted tributaries of the Delta Clearwater River, outside of the normal mainstem index area, from 1994 to 1998, after which an expansion factor was used to estimate the escapement to the areas.
[k] Aerial survey, fixed wing or helicopter.
[m] Poor survey.
[n] Boat Survey.
[p] Weir was operated at the mouth of Clear Creek (Shores Landing).
[r] Expanded estimate based on partial survey counts and historic distribution of spawners from 1977 to 1980.
[s] The West Fork Andreafsky was also surveyed and 830 chum salmon were observed.
[t] Weir project terminated on October 4, 1993. Weir normally operated until mid to late October.
[u] A total of 298 coho salmon passed between 11 September and 4 October 1994. However, an additional 1,500-2,000 coho salmon were estimated pooled downstream just prior to weir removal.
[v] Weir project terminated September 27, 1994. Weir normally operated until mid-October.
[w] An additional 1,000 coho salmon were estimated pooled downstream of weir on October 2, 1995, just prior to weir removal.
[x] Survey of western floodplain only.
[y] Combination foot and boat survey.
[z] No survey of Wood Creek due to obstructions in creek.
[aa] Preliminary.
[ab] Sustainable escapement goal (SEG) established January 2004, (replaces BEG of greater than 9,000 fish established March, 1993) based on boat survey counts of coho salmon in the lower 17.5 river miles during the period October 21 through 27.

Appendix A17.–Fall chum salmon age and sex percentages with mean lengths collected from selected Yukon River escapement projects, 2005.

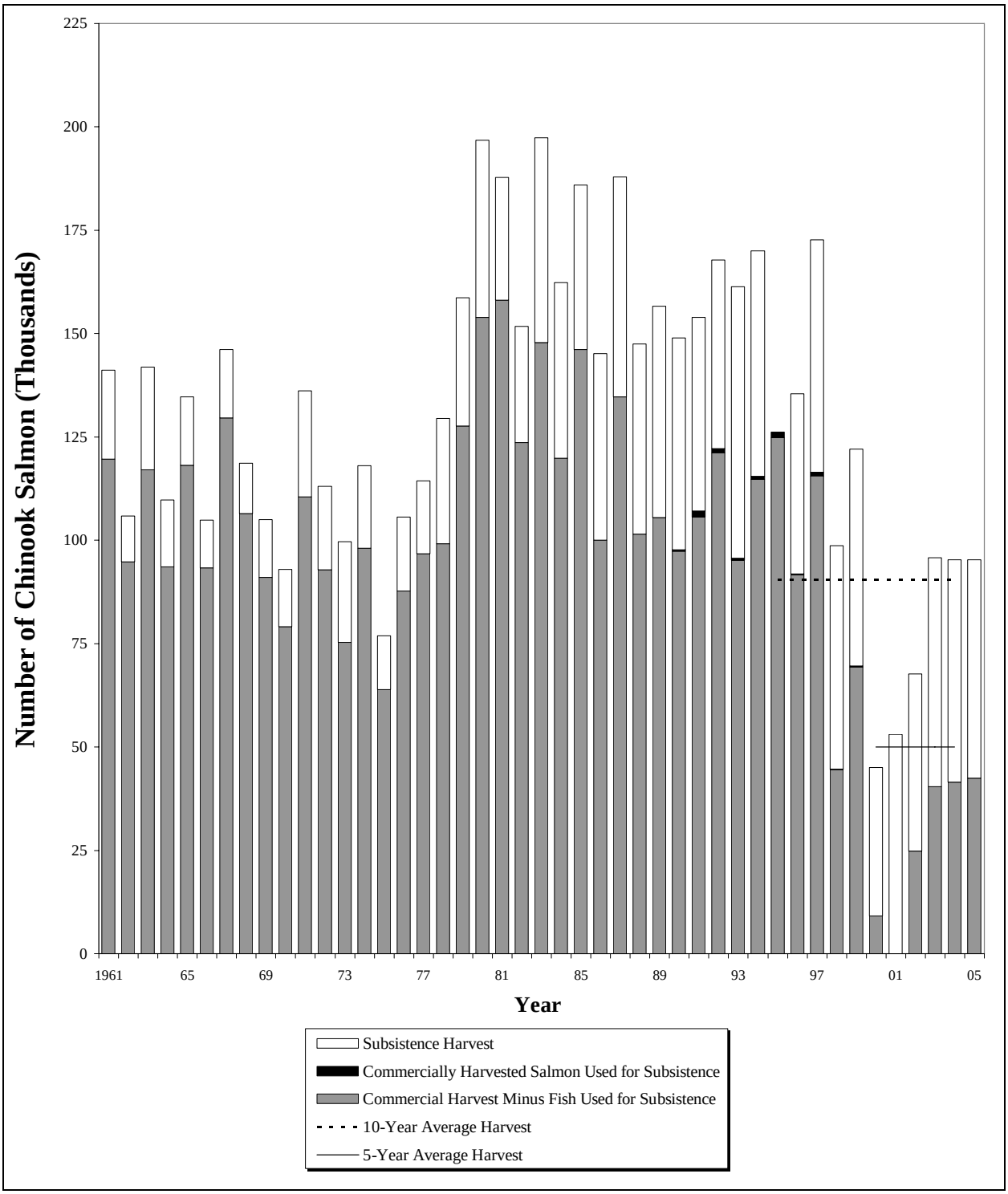
Location	Sample Size		Age 3	4	5	6	7	Total
Chandalar River b	172	Males	0.0	48.8	2.9	0.6	0.0	52.3
		Females	0.0	42.4	5.2	0.0	0.0	47.7
		Total	0.0	91.3	0.0	0.6	0.0	100.0
		Male mean length	-	604	615	699	-	
		Female mean length	-	575	566	-	-	
Delta River a	172	Males	0.0	39.5	4.7	0.6	0.0	44.8
		Females	2.3	47.7	5.2	0.0	0.0	55.2
		Total	2.3	87.2	9.9	0.6	0.0	100.0
	Mean Length	Males	-	612	607	620	-	
		Females	556	581	591	-	-	
Sheenjek River a	84	Males	0	41.6	11.9	1.2	0	54.7
		Females	1.2	40.5	3.6	0	0	45.3
		Total	1.2	82.1	15.5	1.2	0.0	100.0
	Mean Length	Males	-	623	643		-	
		Females	580	600	638	-	-	
Toklat River a	160	Males	0.6	36.2	4.4	0.6	0.0	41.8
		Females	4.4	46.9	6.9	0.0	0.0	58.2
		Total	5.0	83.1	11.3	0.6	0.0	100.0
	Mean Length	Males	570	595	589	585	-	
		Females	552	563	581	-	-	

APPENDIX A: FIGURES



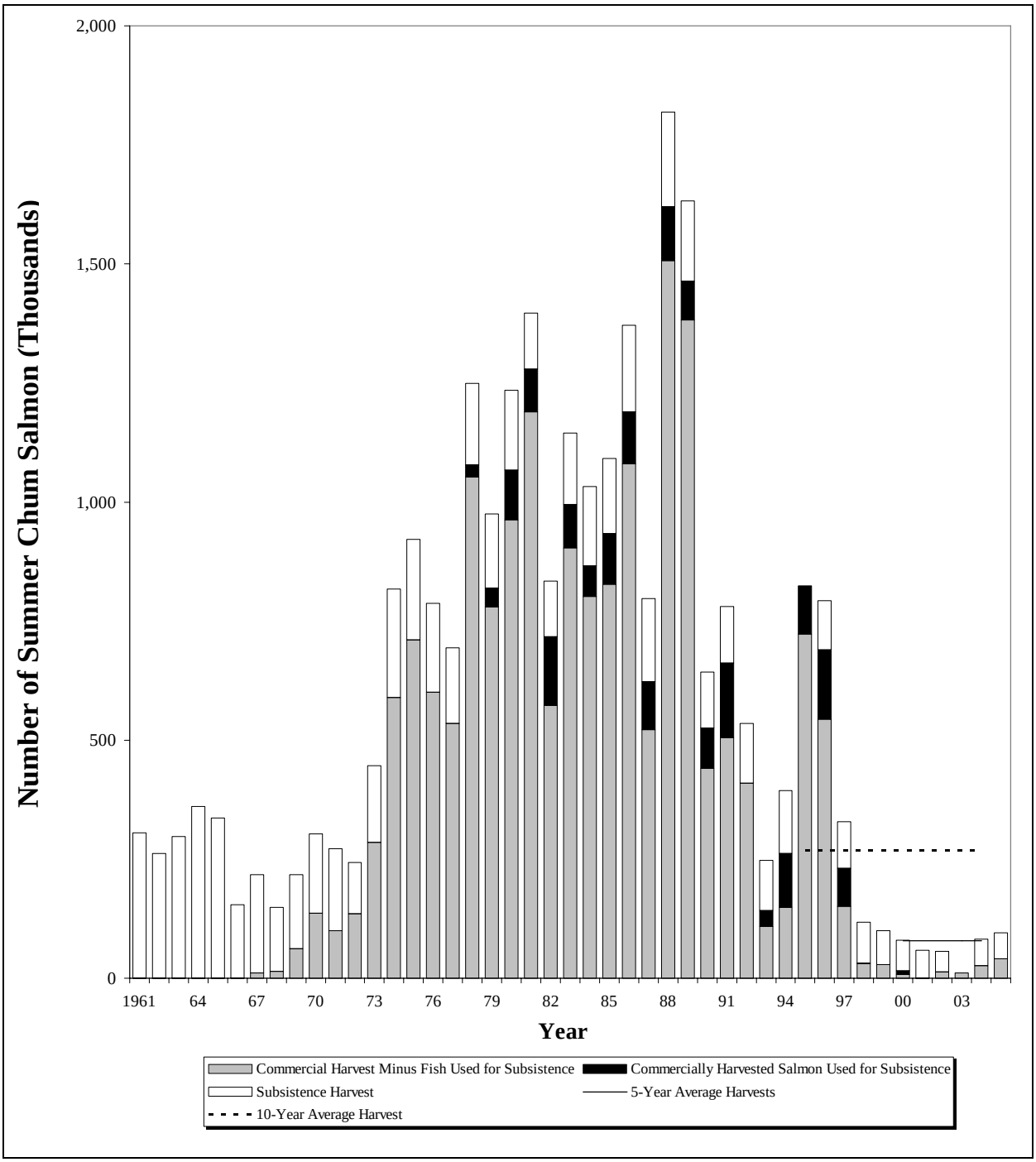
Note: Alaskan harvest estimates other than commercial are unavailable at this time.

Appendix Figure A1.–Total utilization of salmon, Yukon River, 1900-2005.



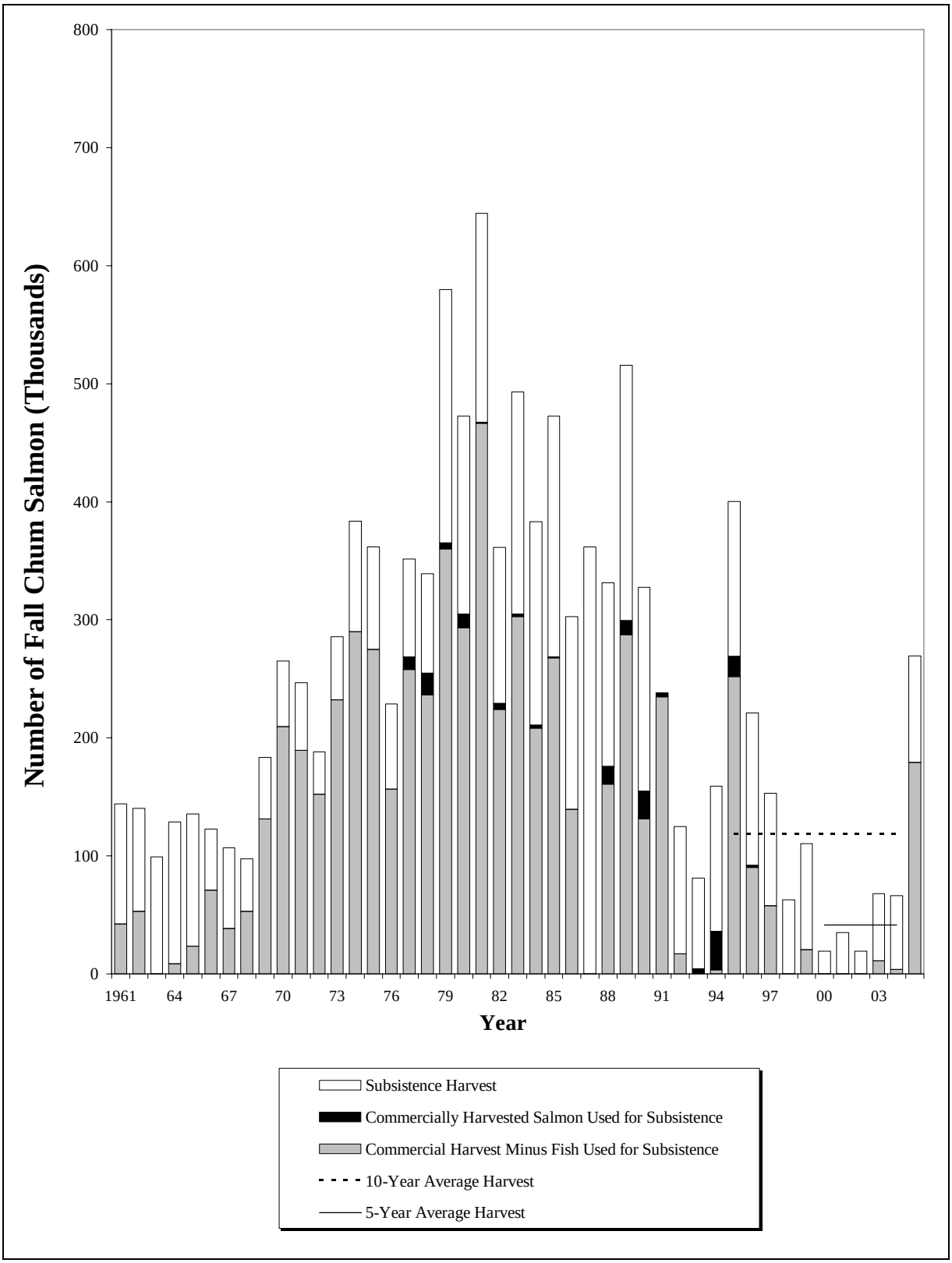
Note: The 2001 commercial fishery was closed. Alaskan harvest estimates other than commercial are unavailable at this time.

Appendix Figure A2.–Alaskan harvest of Chinook salmon, Yukon River, 1961-2005.



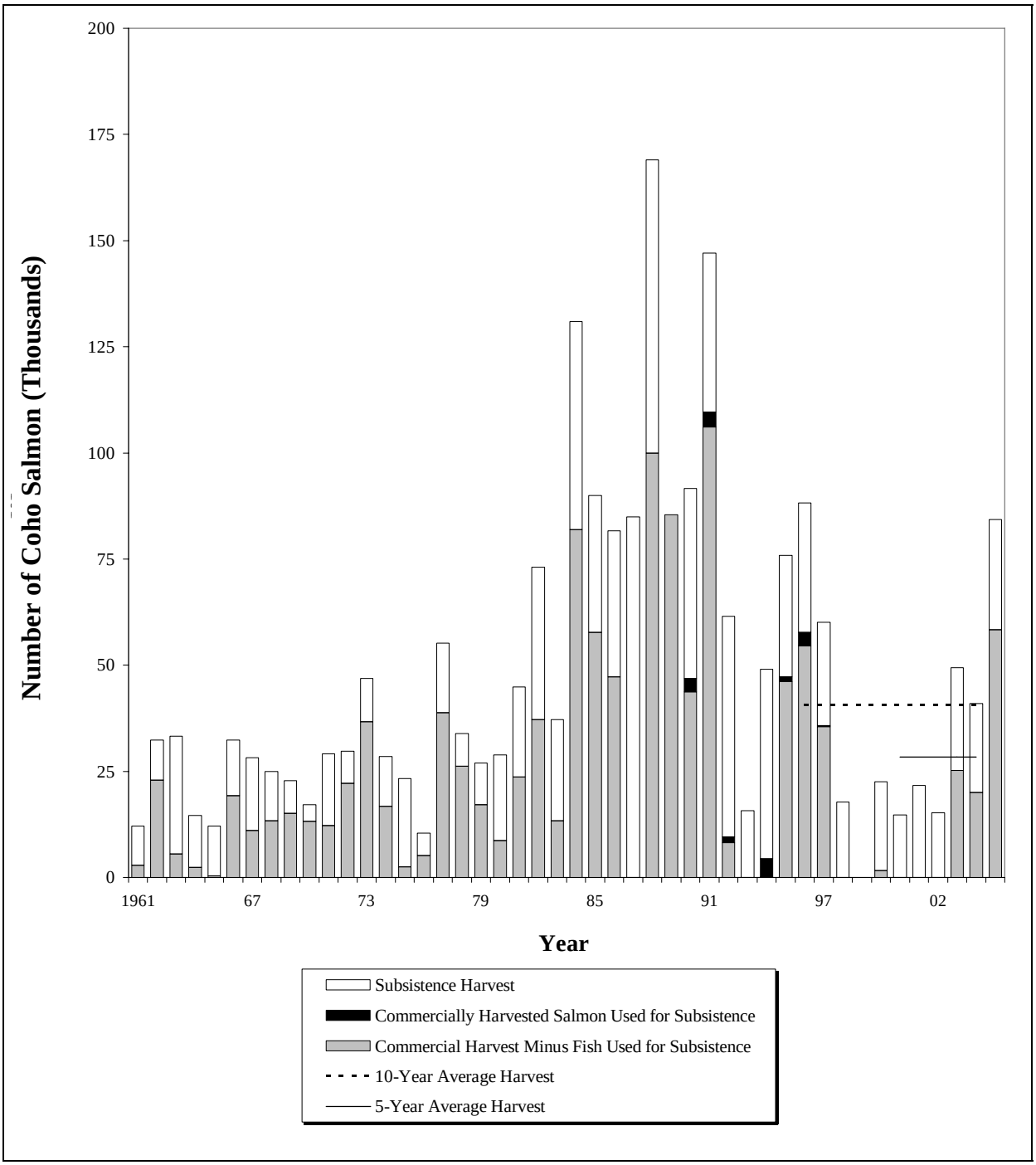
Note: The 2005 harvest estimates other than commercial are unavailable at this time.

Appendix Figure A3.–Alaskan harvest of summer chum salmon 1961-2005.



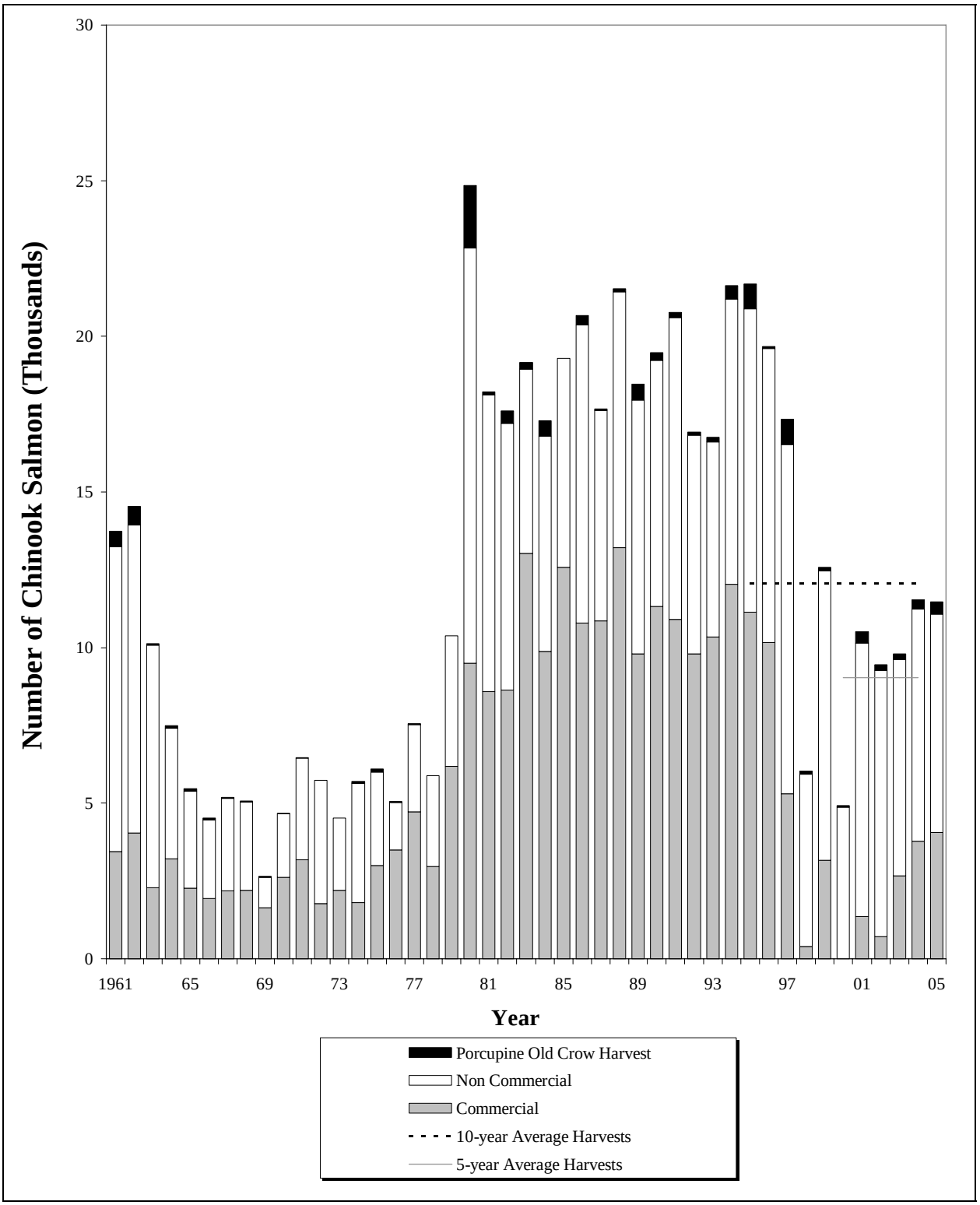
Note: The commercial fishery was closed 2000-2002. The 2005 subsistence harvest estimates are unavailable at this time.

Appendix Figure A4.–Alaskan harvest of fall chum salmon, Yukon River, 1961-2005.



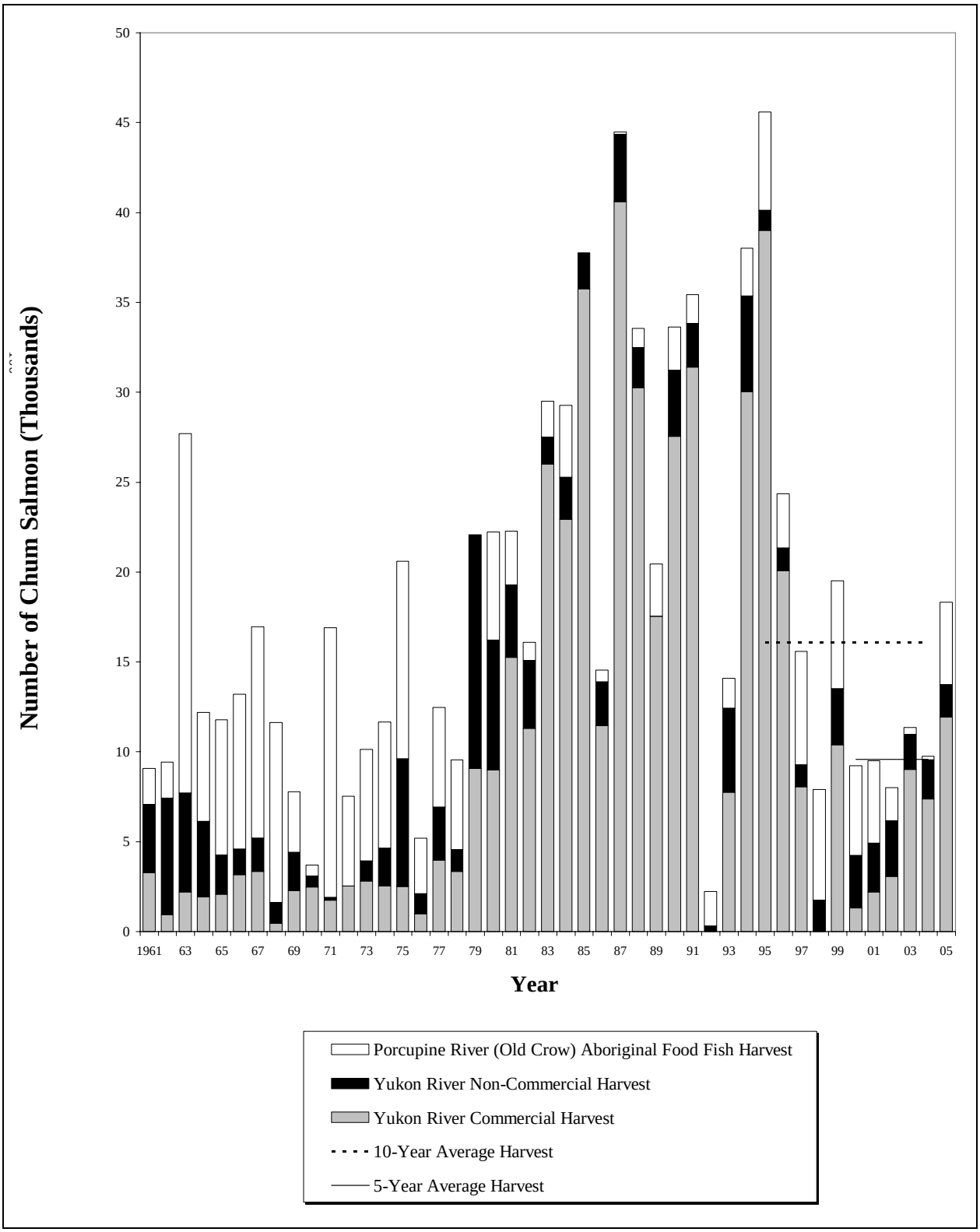
Note: The commercial fishery was closed 2000-2002. The 2005 subsistence harvest estimates are unavailable at this time. Commercial harvest is not adjusted for subsistence use of commercially caught fish.

Appendix Figure A5.–Alaskan harvest of coho salmon, Yukon River, 1961-2005.



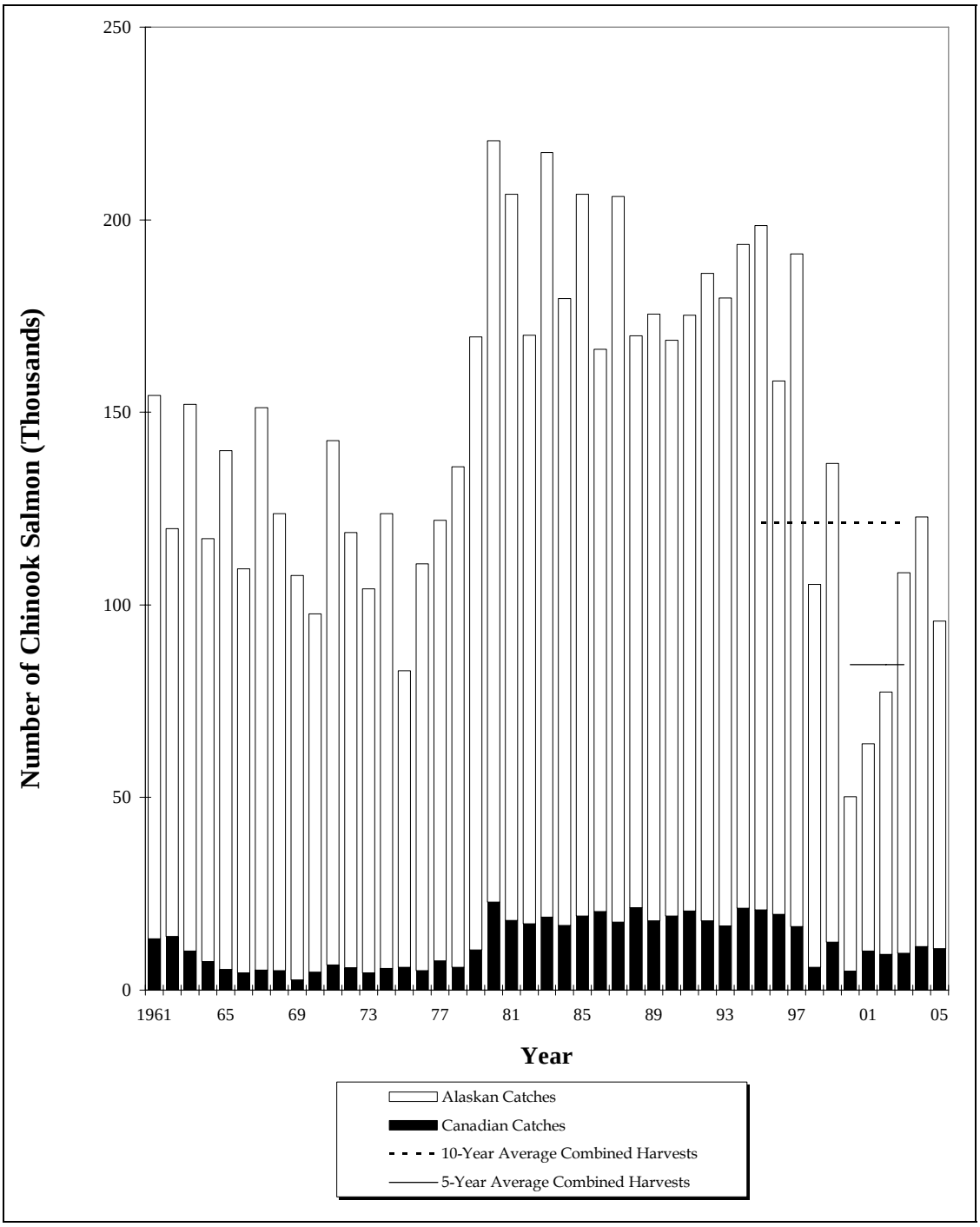
Note: Catch data for 2005 are preliminary.

Appendix Figure A6.–Canadian harvest of Chinook salmon, Yukon River, 1961-2005.



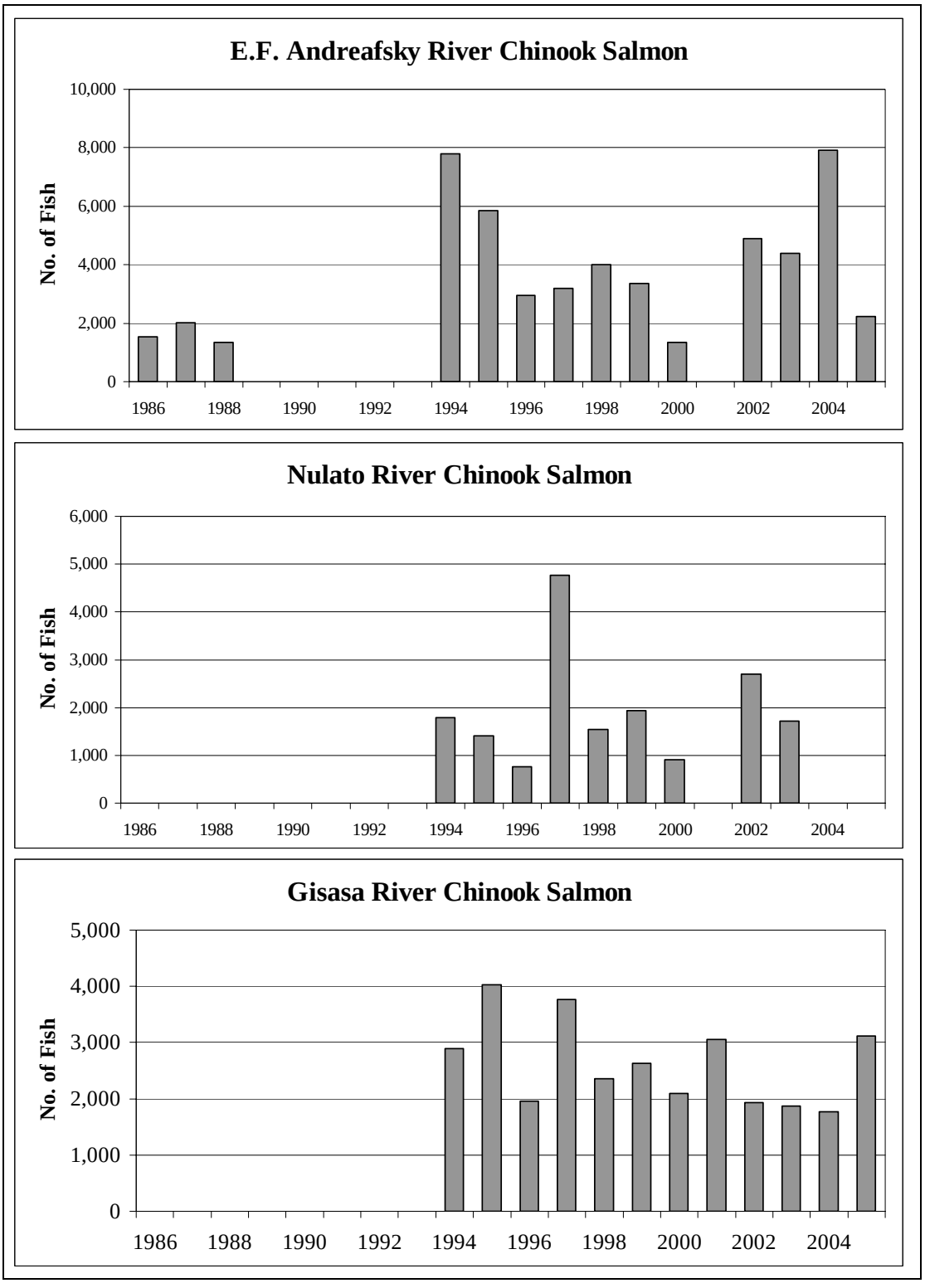
Note: Catch data for 2005 are preliminary.

Appendix Figure A7.–Canadian harvest of chum salmon, Yukon River, 1961-2005.



Note: Catch data for 2005 are incomplete and preliminary.

Appendix Figure A8.–Total utilization of Chinook salmon, Yukon River, 1961-2005.

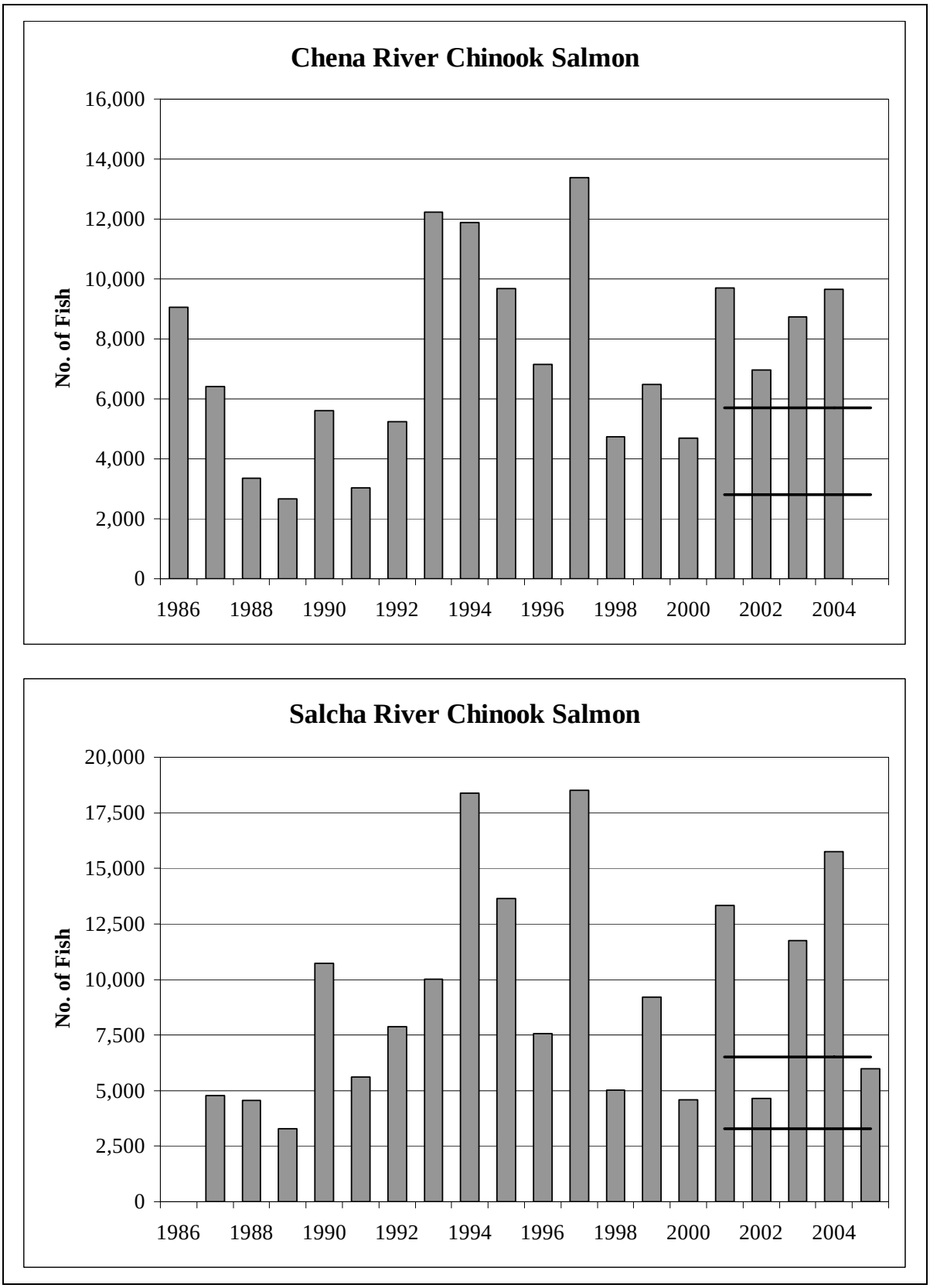


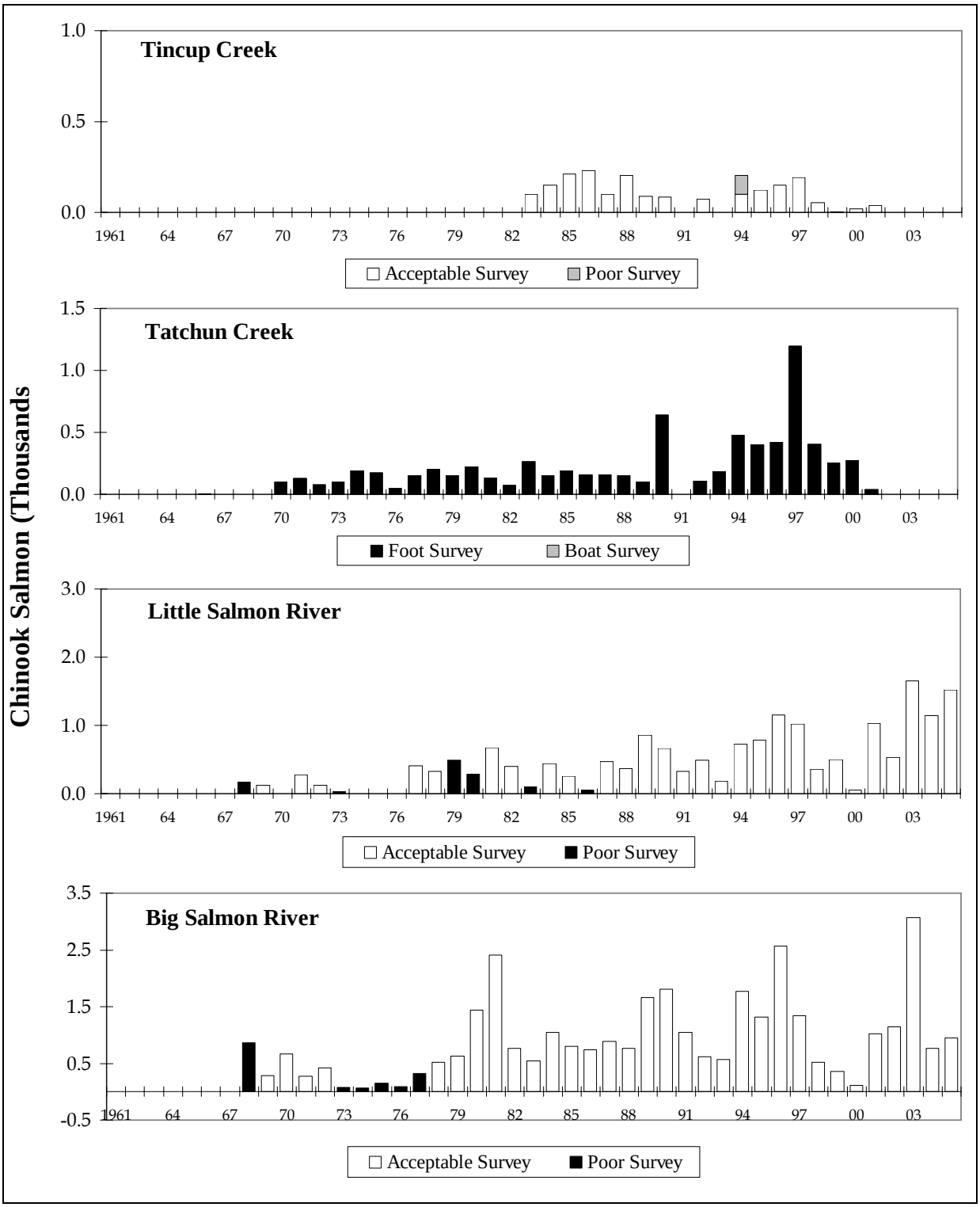
Note: The BEG range is indicated by the horizontal lines for tributaries with BEGs. The vertical scale is variable.

Appendix Figure A9.–Chinook salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1986-present.

-continued-

Appendix Figure A9.–Page 2 of 2.



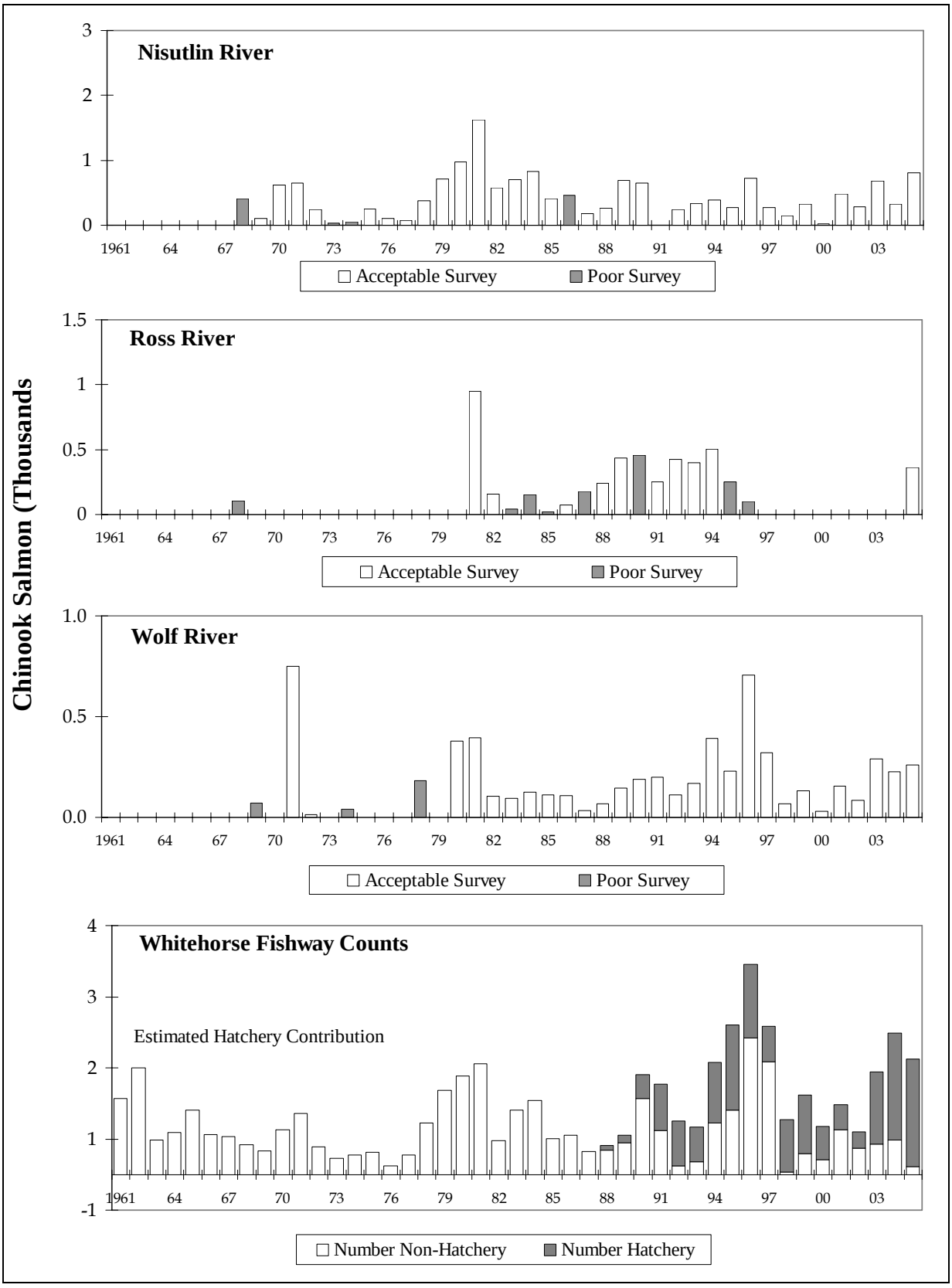


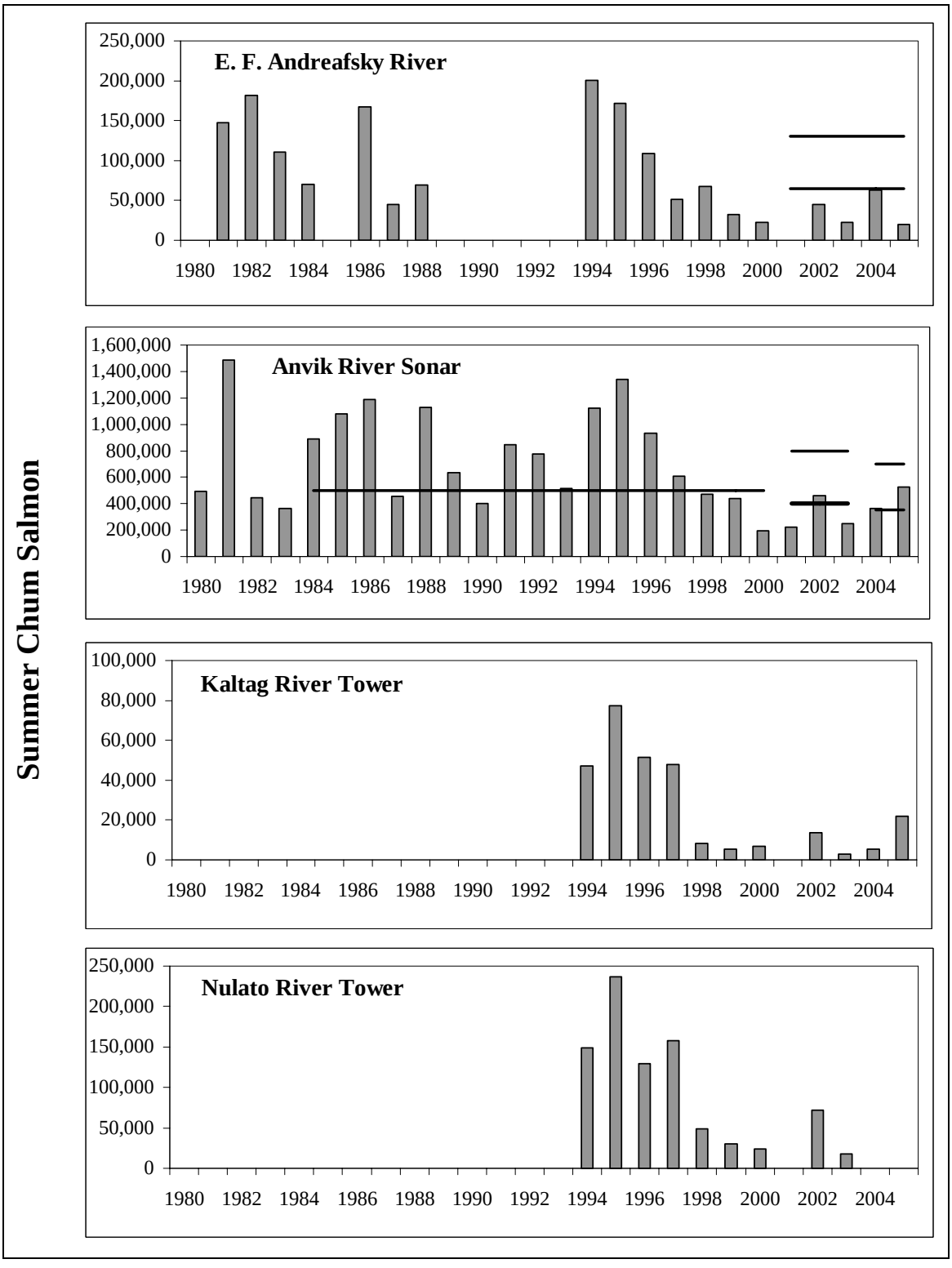
Note: Data are aerial survey observations unless noted otherwise. The vertical scale is variable.

Appendix Figure A10.–Chinook salmon escapement data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-2005.

-continued-

Appendix Figure A10.–Page 2 of 2.



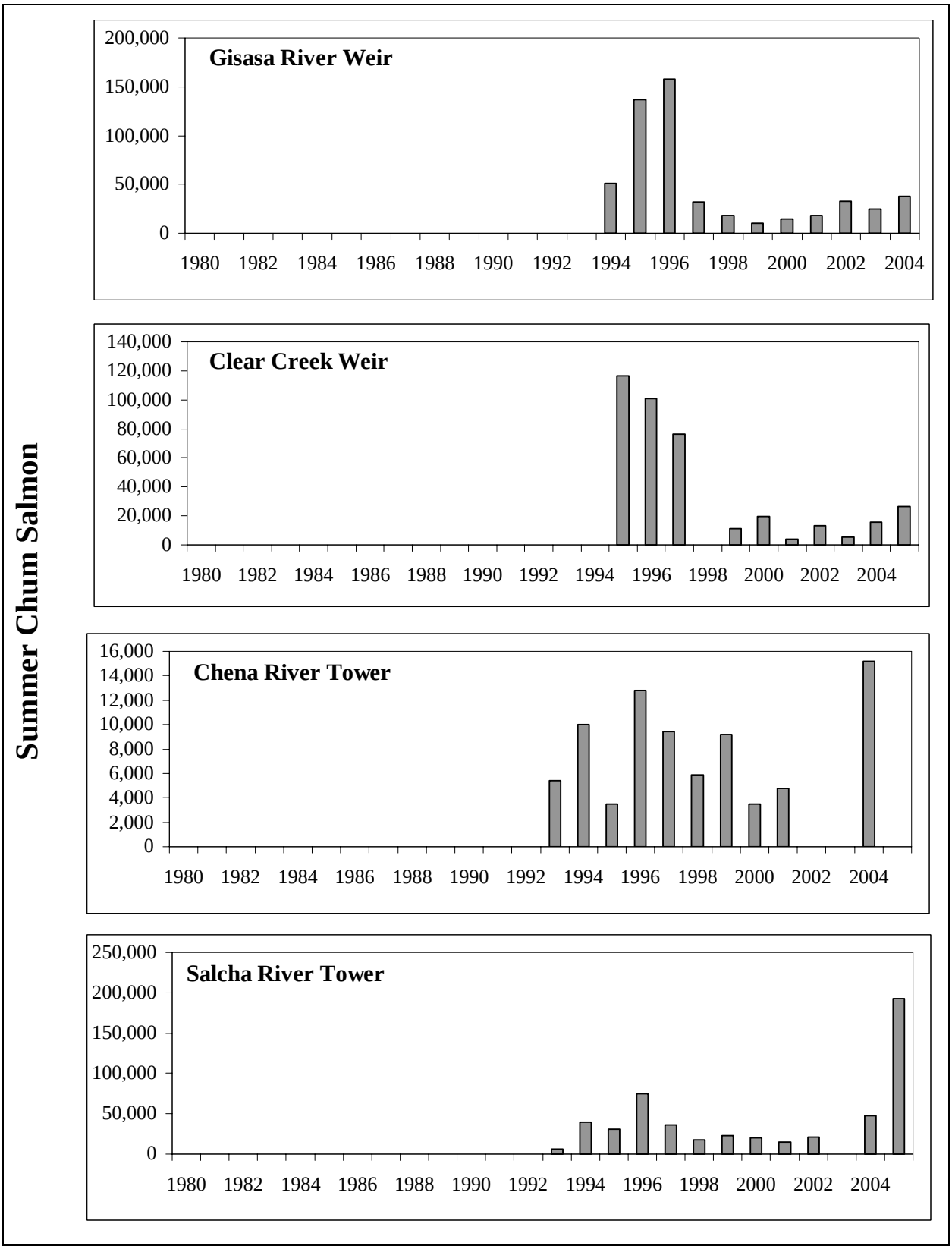


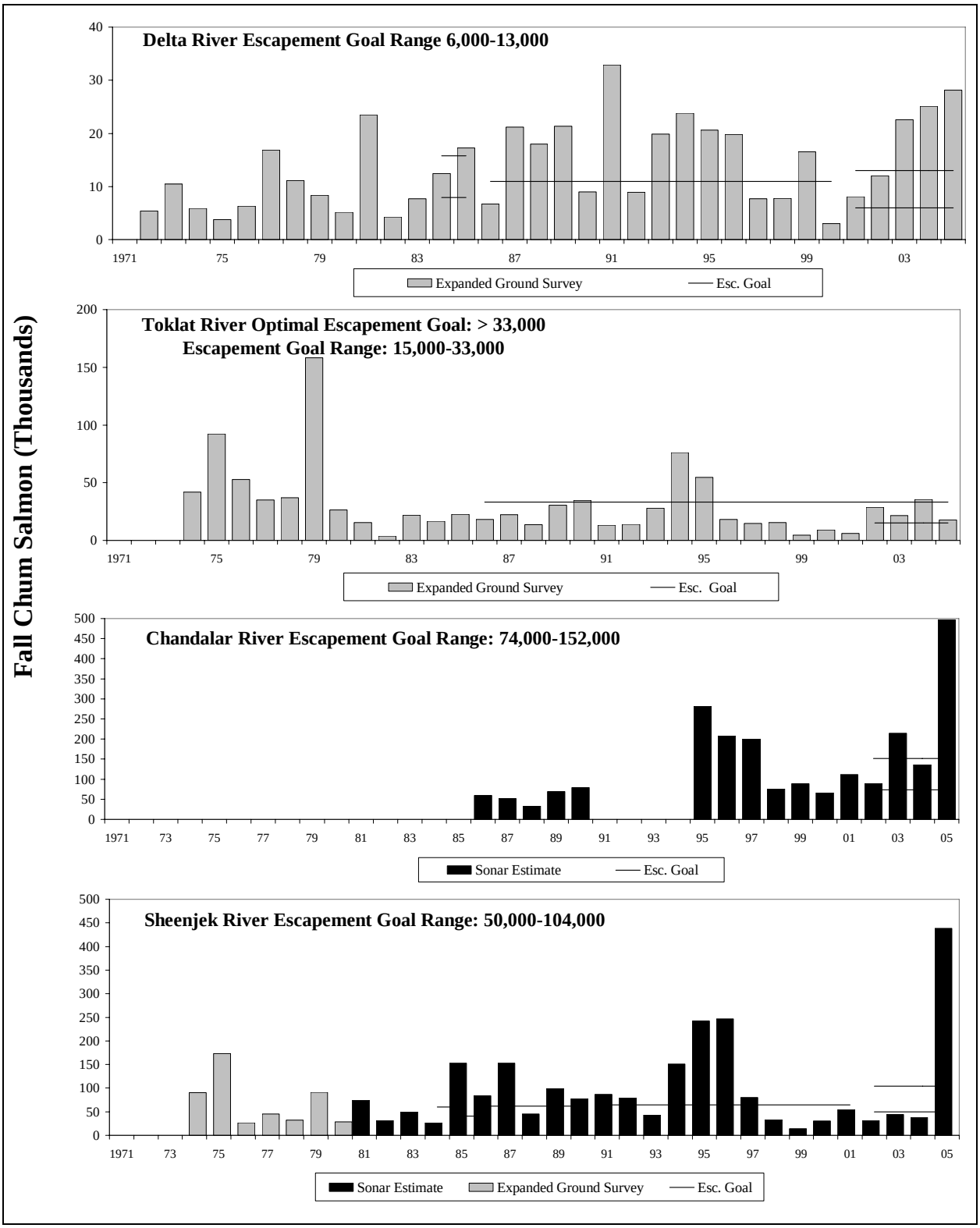
Note: The BEG range is indicated by the horizontal lines for tributaries with BEGs. The vertical scale is variable.

Appendix Figure A11.–Summer chum salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1980-2005.

-continued-

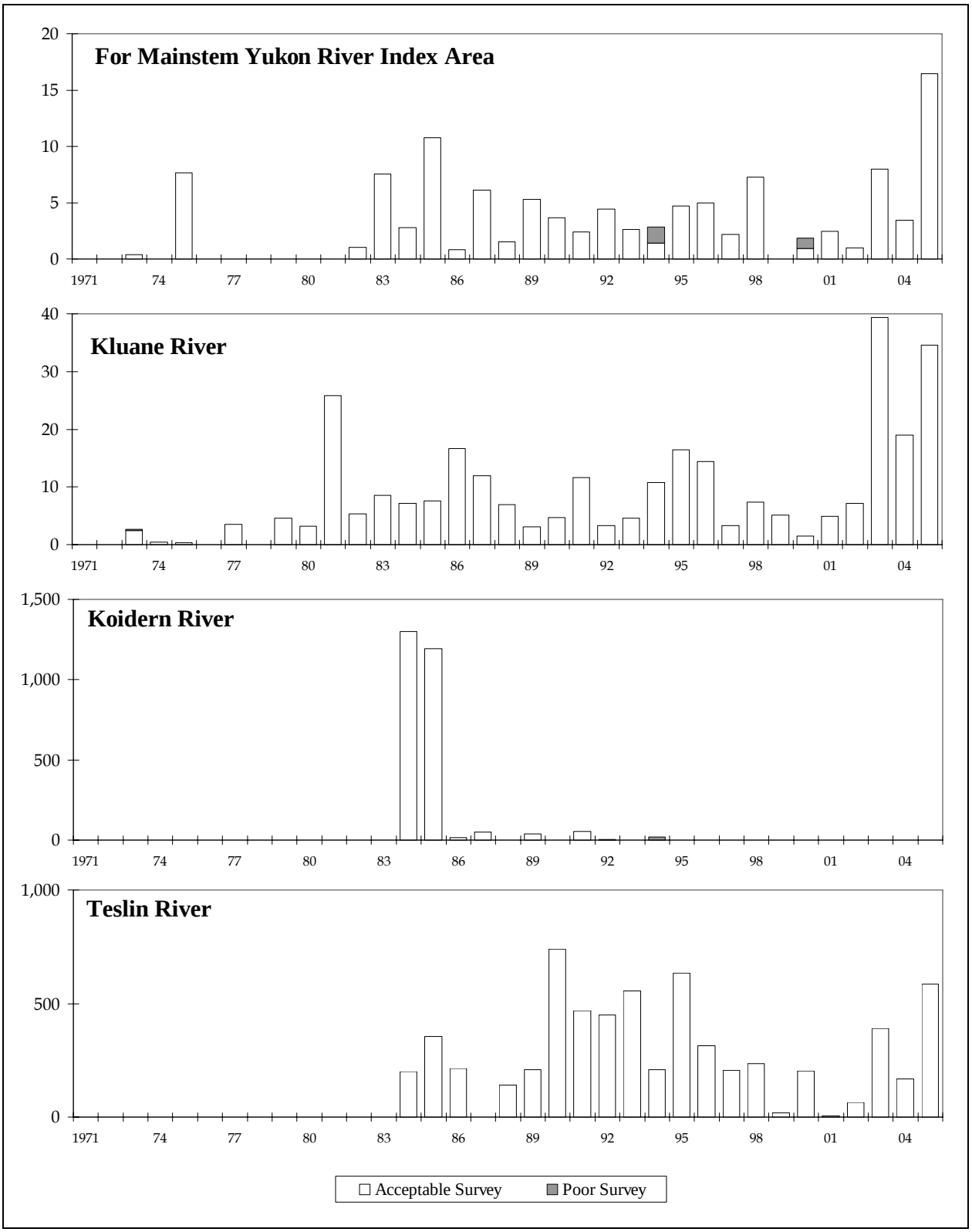
Appendix Figure A11.–Page 2 of 2.





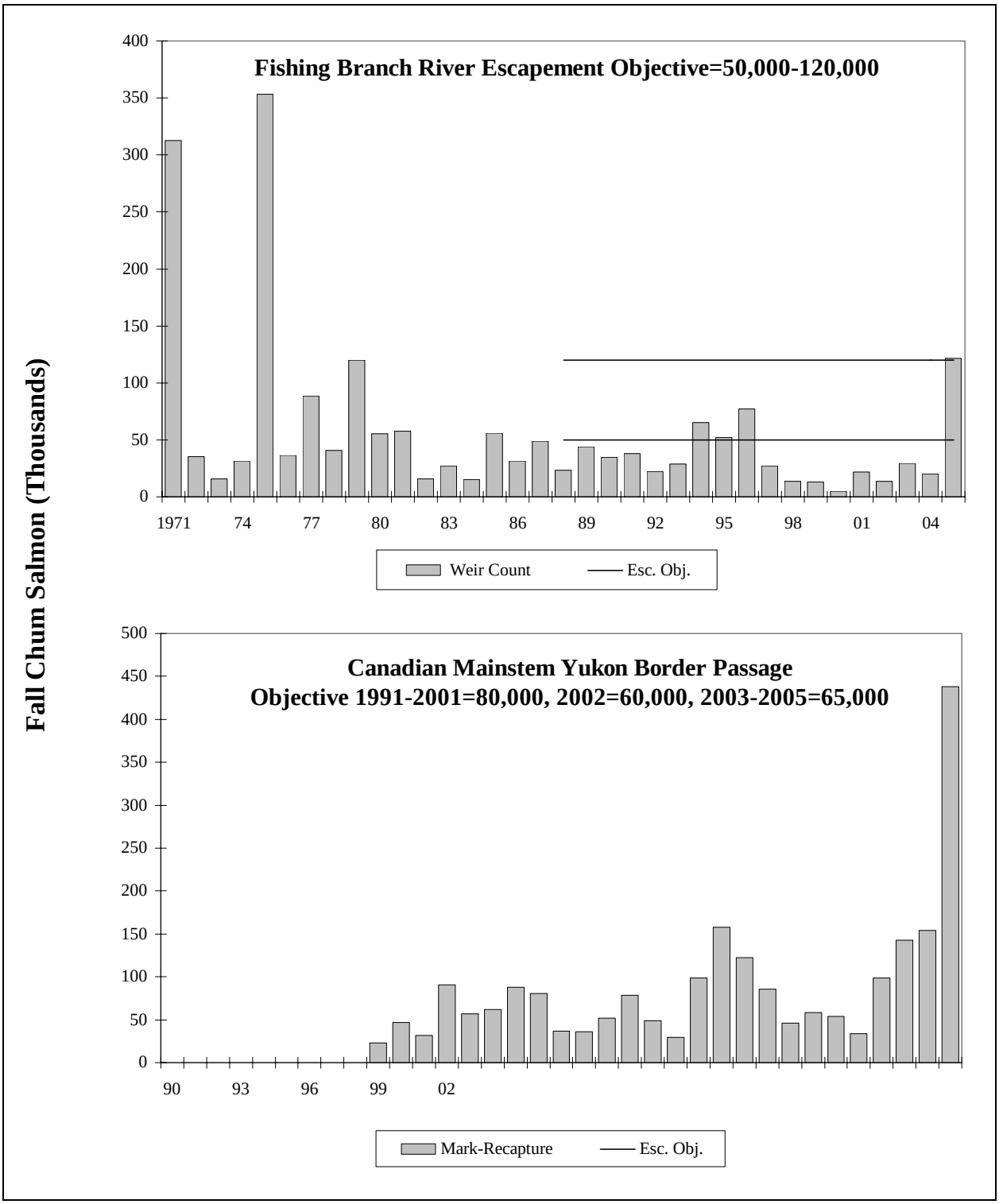
Note: Horizontal lines represent biological escapement goals or ranges. The vertical scale is variable.

Appendix Figure A12.–Fall chum salmon escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1971-2004.



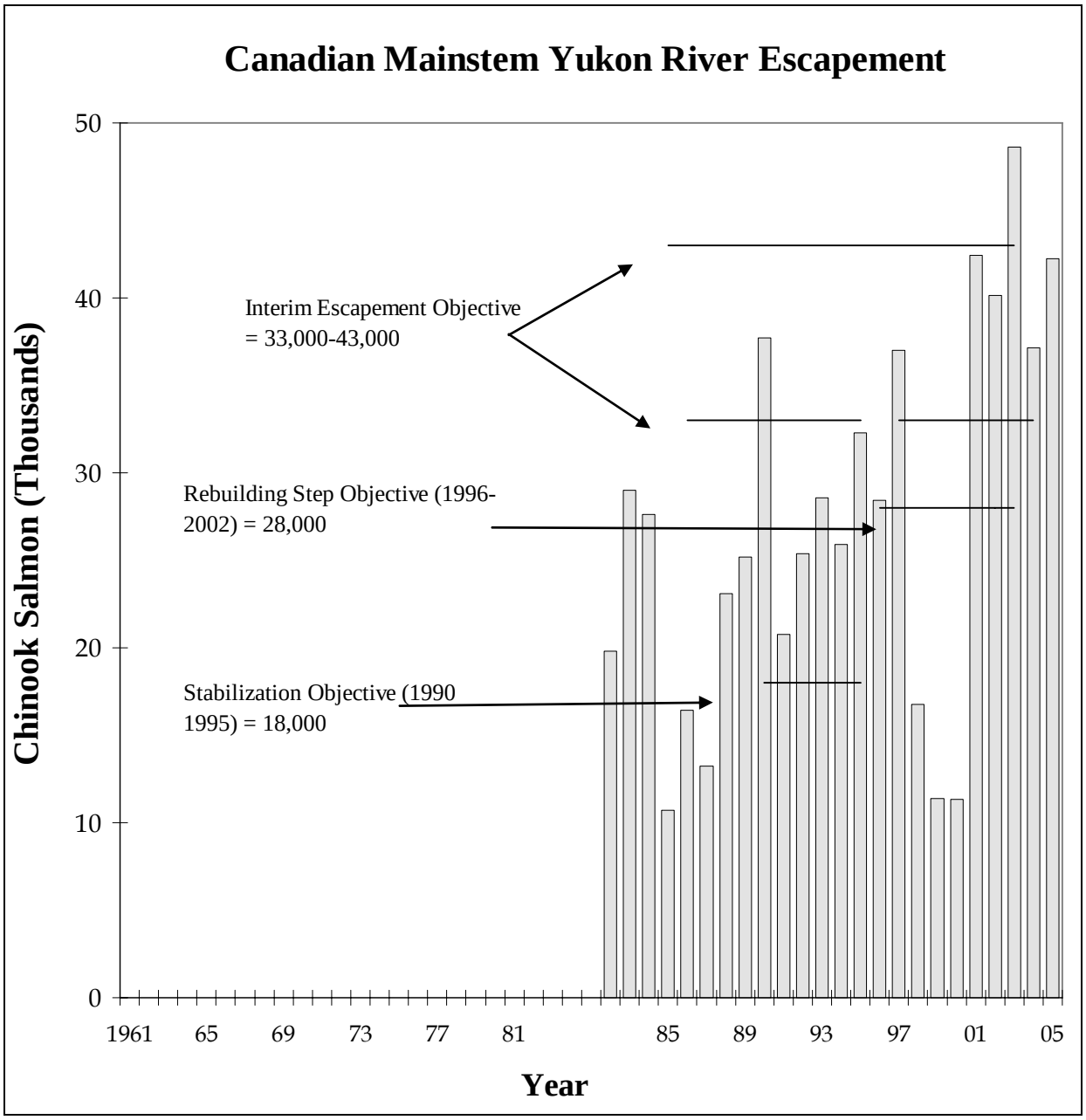
Note: vertical scale mainstem and Kluane in thousands while the Koidern and Teslin are in hundreds.

Appendix Figure A13.–Chum aerial survey data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1971-2005.



Note: Horizontal lines represent interim escapement goal objectives or ranges.

Appendix Figure A14.–Chum salmon escapement estimates for spawning areas in the Canadian portion of the Yukon River drainage, 1971-2005.



Note: Horizontal lines represent the interim escapement objective range of 33,000-43,000 salmon, the rebuilding step objective of 28,000 salmon and the stabilization objective of 18,000 salmon.

Appendix Figure A15.–Estimated total Chinook salmon spawning escapement in the Canadian portion of the mainstem Yukon River drainage, 1982-2005.

APPENDIX B

SUMMARY OF YUKON RIVER ESCAPEMENT MONITORING PLANS

DRAFT ESCAPEMENT MONITORING PLAN FOR CANADIAN STOCKS

JTC - Meeting

Anchorage

November 21-23, 2005

AND

SALMON ESCAPEMENT MONITORING PROJECTS IN ALASKA

JTC - Meeting

Fairbanks

November 7-8, 2005

Yukon River Panel Meeting

Anchorage

December 5-8, 2005

Draft Escapement Monitoring Plan for Canadian stocks

Objectives:

1. improve border escapement/border passage estimates
2. estimate distribution of escapements in Canada
3. review and improve escapement attribute data – age, size, sex, stock composition

General Approach:

1. combine main river estimates with genetics to apportion production into CU's;
2. develop associated harvest sampling program – stock ID by CU;
3. ground truth with large system project(s) (Big Salmon, Klondike, Teslin/Pelly);
4. intensive small tributary projects – **counts plus sampling**.
5. consider development of joint databases.

Interim CU's (subject to ongoing review):

Chinook	Chum
1. Teslin – mainstem, Nisutlin	1. White - Kluane
2. Pelly – Blind Cr, Ross	2. mainstem Yukon
3. mid-Yukon tribs – B. Salmon, L. Salmon, Tatchun	3. Teslin
4. Stewart - McQuesten	4. Porcupine – Fishing Br.
5. mainstem Yukon -	
6. south Yukon tribs – Whitehorse, Takhini	
7. North Yukon tribs - Klondike	
8. White – Nisling or Tincup	
9. Porcupine	

Priorities:

1. main river estimates:
    - perfect sonar
    - continue m/r
    - determine long term resourcing needs
    - analyse sonar vs m/r: within five years decide on need for redundancy
    - develop run projection model
    - develop communication with project
2. genetic program:
    - complete standardisation of databases
    - continue baseline sampling – develop prioritized list of sample requirements
    - determine technique based on required resolution and cost effectiveness
    - develop sampling design – how many samples are required to determine contributions of CU's.
3. large tributary estimate:
    - continue Big Salmon
    - select one/two other large systems (e.g. Teslin/Pelly) for potential abundance projects
    - conduct feasibility studies on prospective systems
    - determine best method
4. intensive monitoring program:
    - prioritise needs
    - feasibility studies
    - determine method – must include sampling project
    - design sampling program
    - analyse value as index
5. Aerial surveys:
    - Review current program
    - Recommendations
6. Escapement sampling:
    - Review current data sources and determine immediate program needs
    - Tributary/population specific data vs system data (sampling in tribs vs sampling at Bio Island/sonar – priority given to tributary specific sampling;
    - Incorporate standarised approach into every intensive project

SALMON ESCAPEMENT MONITORING PROJECTS IN ALASKA

JTC - MEETING

Fairbanks

November 7-8, 2005

This meeting was convened to discuss salmon escapement monitoring projects in the Alaska portion of the Yukon River drainage as part of the continuing JTC planning process (agenda attached). Meeting participants ascertained the JTC planning approach could be used to establish monitoring and assessment priorities in Alaska as well as for Canadian origin salmon. An introductory presentation initiated discussion of items, which should be considered in defining units. Units could be ordered hierarchically, by number of assessment projects, socio-economics, by stock genetics, productivity, biologically or by how stocks are managed. Presentations on genetic stock groupings of Chinook and chum salmon, and Chinook radio telemetry run timing and distribution were provided for background information.

Conservation management units (CMU) as introduced by the JTC plan were discussed. Currently, there is no usage of CMU or conservation units in Alaska salmon fisheries. It was settled at this time to call units defined in Alaska 'Geographic Units'. Establishment of CMUs in Canada may differ and will be based on their needs. This group determined geographic units by species that can provide a framework for prioritizing and establishing spawning escapement monitoring projects in Alaska. It was difficult to place Chinook originating from the upper Koyukuk River drainage in a unit because they are more similar genetically to Tanana River fish than those originating in the upper Yukon, but Tanana River fisheries are managed separately from the rest of the Yukon River drainage. The upper Koyukuk and upper Yukon River drainages in Alaska were combined, because of the predominance of subsistence fisheries in these locations, hence similar management. Chinook spawning in the Upper Koyukuk and the Yukon River drainage from the Tanana confluence up to the border are part of the historical middle Yukon grouping and genetically distinct from the lower river unit. It should be understood these geographic units may change in the future based on their applicability to fisheries management and new information.

The next presentations covered existing run assessment and escapement monitoring projects by species. A list of 15 criteria for evaluating projects was developed. These points were not prioritized and not used as a matrix to evaluate projects, but were used subjectively to prioritize existing and potential new escapement monitoring projects. During discussion of prioritizing projects by species, it was agreed to include run assessment projects as well as spawning escapement projects. In fact, the group agreed the most important information necessary for management is obtaining accurate run abundance estimates by species near the mouth of the Yukon River. It was noted projects are often placed in areas easy to access. We need to be cognizant of projects that are for information that is nice to know versus projects that provide information managers need to know. Age, sex and length information were viewed as an integral part of escapement enumeration projects. This information is necessary for developing brood tables and to assess trends in escapement.

Tabular results of the meeting are attached.

Geographic Units by Species in Alaska

Chinook salmon - three units were defined for Alaska (map attached):

1. Lower – differentiated by timing and as a stock group for many years,
2. Tanana River - a large component of a middle stock group defined years ago and fisheries managed separately from the remainder of the river, and
3. Upper – including upper Koyukuk River drainage and Alaska portion of Yukon River drainage above the confluence of the Tanana River – based on presence of primarily subsistence fisheries and genetically separate from lower unit.

Chum salmon – four units were defined for Alaska (maps attached):

1. Lower Summer,
2. Tanana Summer,
3. Tanana Fall, and
4. U.S. Border Fall.

Coho salmon – two units were defined the same as for summer chum salmon:

1. Lower, and
2. Tanana

List of Criteria for Yukon River Assessment Projects

- Size of run or spawning escapement
- Number of salmon species present and counted
- Geographic distribution
- Single tributary versus drainage assessment
- Useful as index of a broader area
- Cost effectiveness – collaboration, coordination, platform for other studies
- Access and logistics
- Provides opportunities for capacity building or an increase in stewardship
- Ability to fill an overall gap in the research program – baselines
- Long-term database
- Established escapement goal
- Importance for subsistence, commercial or other uses
- Ability to assess habitat perturbation
- Useful to management – management implications
- Data quality

PRIORITIZED LIST OF YUKON RIVER PROJECTS IN ALASKA

Chinook salmon

Lower River Unit

1. Pilot Station sonar
   Lower Yukon set net test fish
   Lower Yukon drift test fish
2. Gisasa River weir
3. E.F. Andreafsky River weir
4. Anvik ASL carcass survey
5. Aerial surveys of tributaries with escapement goals
6. Tozitna River weir/Nulato/Other

Tanana River Unit

1. Salcha River tower
2. Chena River tower
3. Nenana test fish wheel video
4. Goodpaster River tower

Upper River Unit

1. Henshaw Creek weir
2. Eagle sonar
3. Chandalar River sonar
4. Rapids test fish wheel video

Summer chum salmon

Lower River Unit

1. Pilot Station sonar
   Lower Yukon drift test fish
2. Anvik sonar
3. Gisasa River weir
4. E.F. Andreafsky
5. Henshaw Creek weir
6. Tozitna River weir/Nulato/Other
7. Clear Creek weir
8. Kaltag River tower

Tanana River Unit

1. Salcha River tower
2. Nenana test fish wheel
3. Goodpaster River tower
4. Potential new project e.g. mark and recapture
5. Chena River tower

Fall Chum Salmon

Upper River Unit

1. Pilot Station sonar
   Lower Yukon drift test fish
   Mt. Village test fish
2. Chandalar River – sonar
3. Sheenjek River – sonar
4. Rampart Rapids mark-recapture
5. Eagle sonar
6. GSI – age, sex, length

Tanana River Unit

1. Pilot Station sonar and Lower Yukon test fish
2. Upper Tanana mark and recapture
3. Kantishna mark and recapture
4. Delta River – foot survey

Coho Salmon

Lower River Unit

1. Pilot Station sonar and Lower Yukon test fish, Mt. Village test fish
2. Andreafsky River weir

Tanana River Unit

1. Pilot Station and Lower Yukon test fish
2. Delta Clearwater River – boat survey
3. Nenana River drainage escapement surveys

YUKON RIVER JOINT TECHNICAL COMMITTEE

ALASKA ESCAPEMENT MONITORING PLAN WORKING GROUP MEETING

Westmark Hotel -Yukon Room
813 Noble Street
Fairbanks, AK

November 7-8, 2005

AGENDA

Monday 9:00 am

A) Introduction

- Overview of JTC planning process to date – Holder

B) Alaska Conservation/Management Units by Species

- Genetics presentations on stock groupings and timing
  - Chinook – Templin
  - Summer and fall chum - Flannery
- Radio telemetry fish distribution and timing– Eiler and Spencer
- Group discussion conservation/management units by species

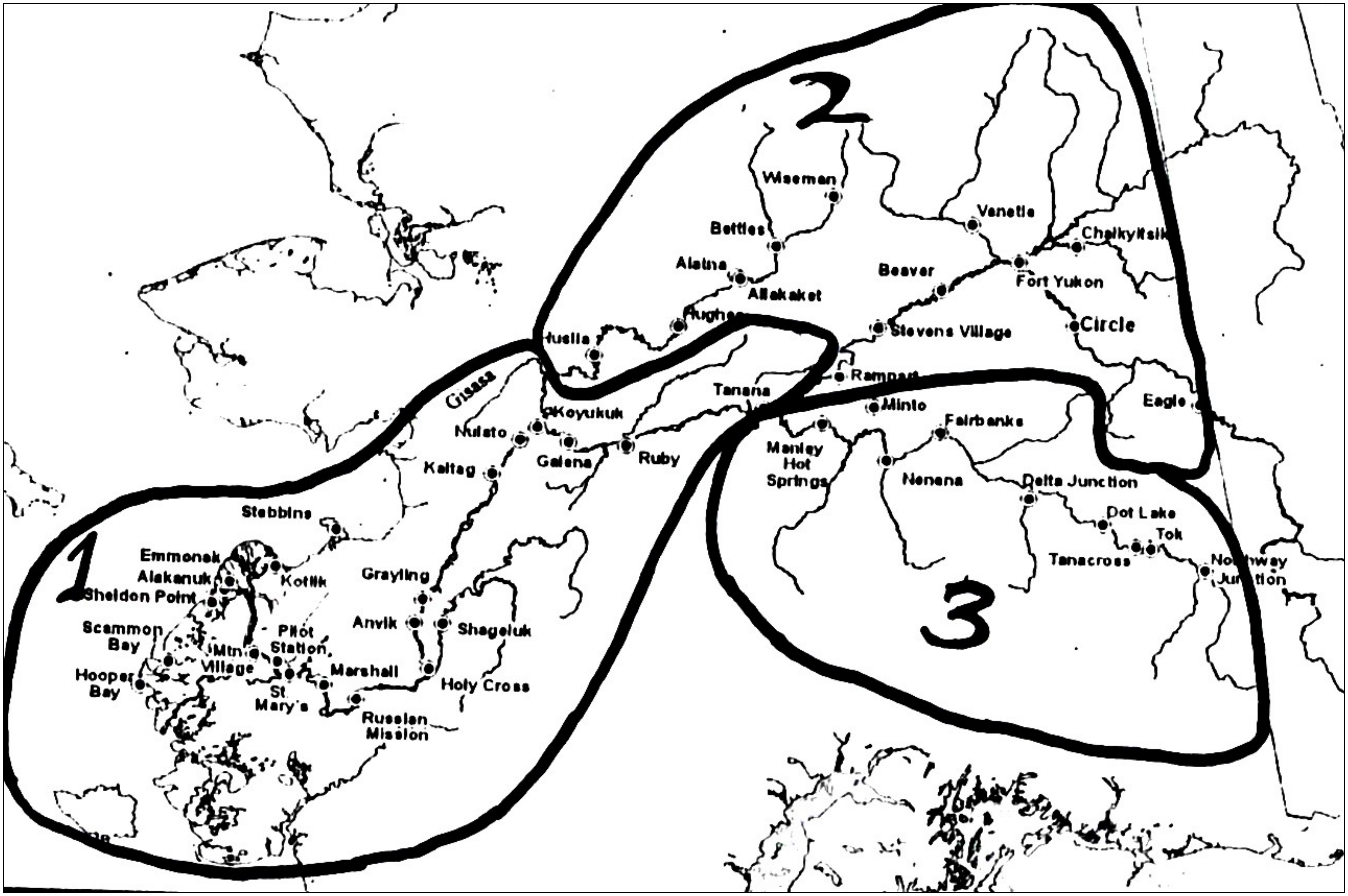
Tuesday 9:00 am

C) Review existing escapement monitoring projects by species

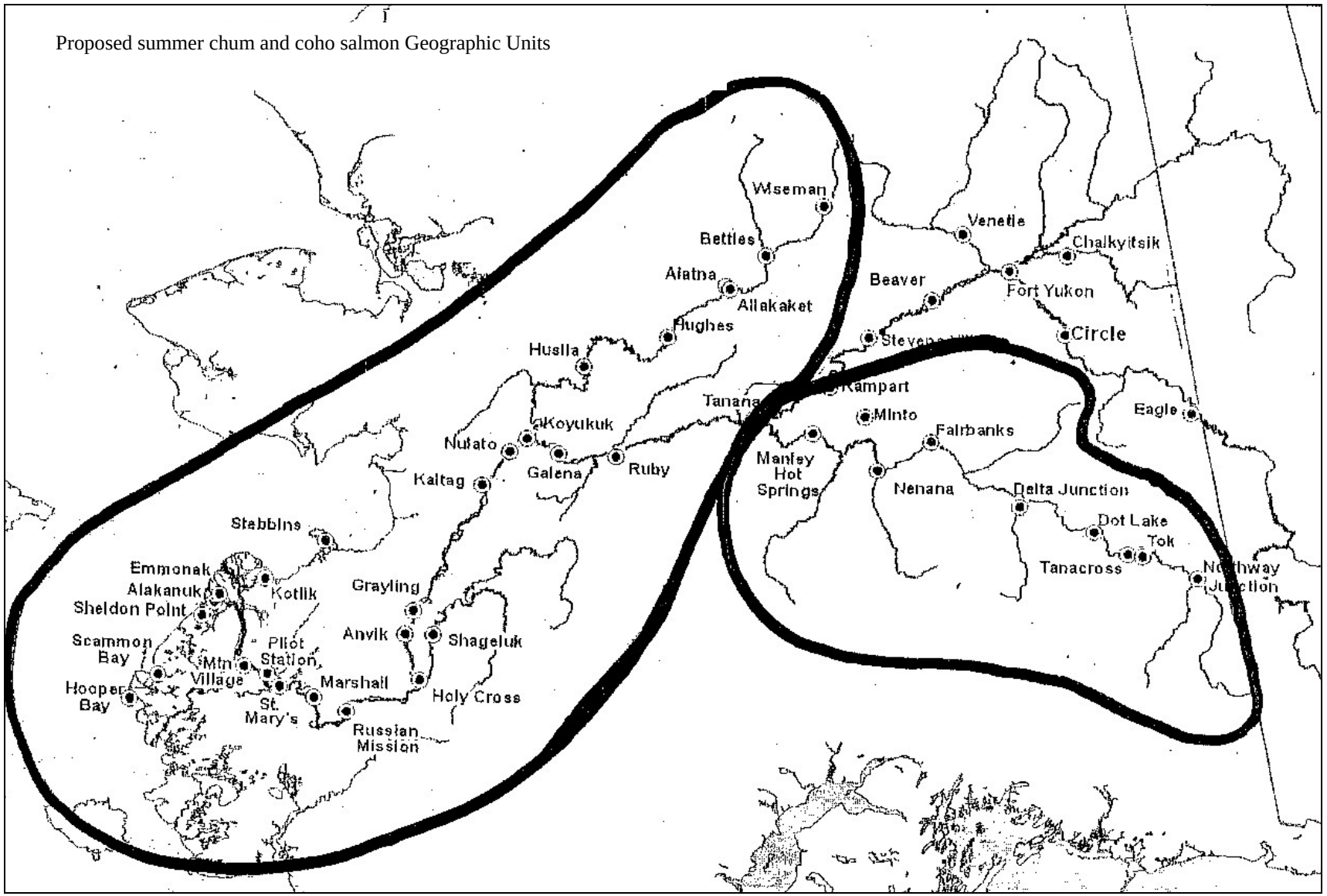
- Chinook and summer chum – Dubois
- Fall Chum and coho – Borba
- Canada Chinook and Fall Chum – Milligan

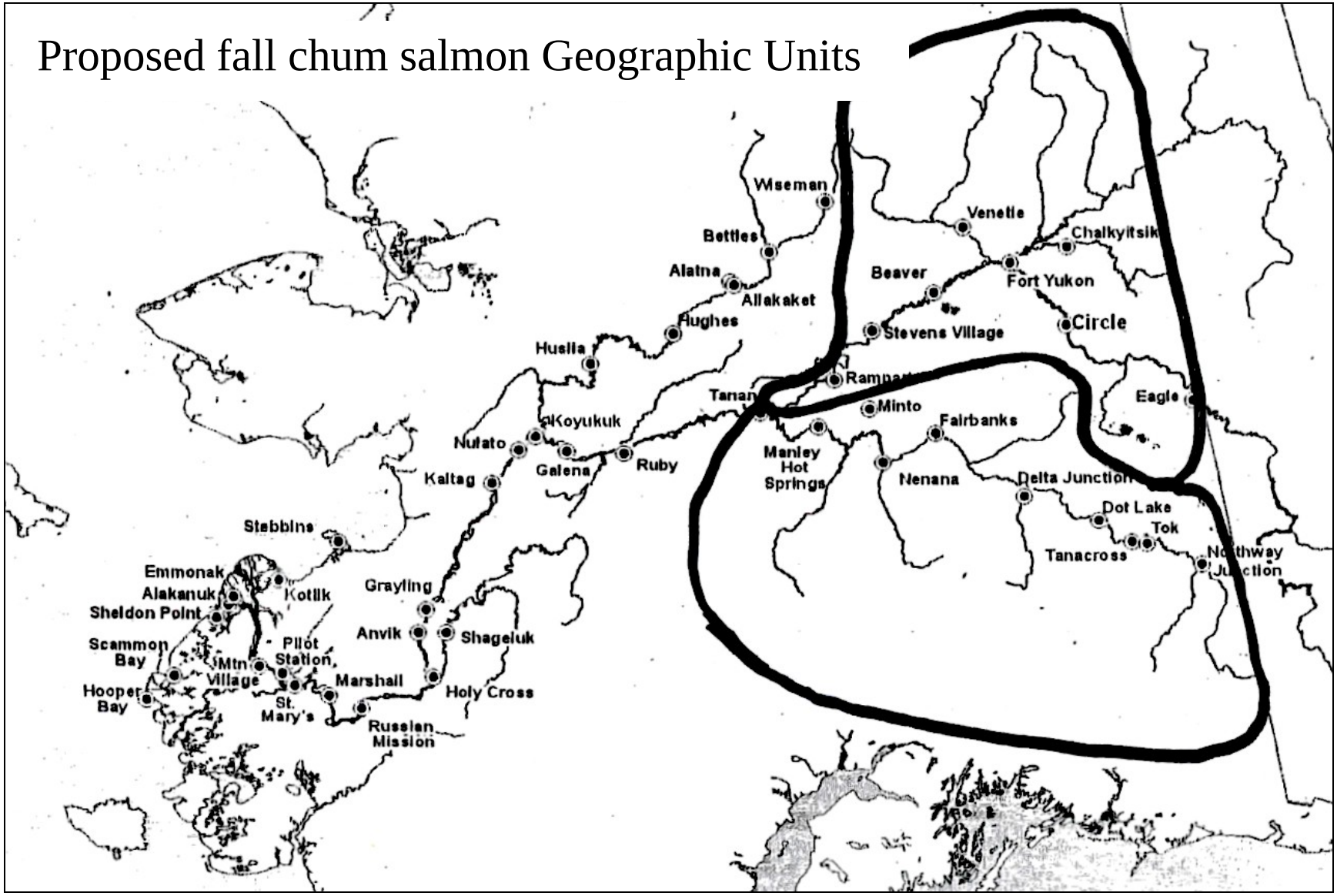
Discuss criteria for escapement projects, e.g. size of run, number of species present, geographic distribution, useful as index of overall abundance or regional abundance, cost effectiveness, and ease of access and logistics

Group discussion escapement monitoring projects – needed and prioritized


1
2
3
Wiseman
Bettles
Alatna
Allakaket
Hughes
Huslia
Gisasa
Koyukuk
Nulato
Galena
Ruby
Kaltag
Tanana
Rampart
Stevens Village
Beaver
Venetie
Fort Yukon
Circle
Eagle
Minto
Fairbanks
Manley Hot Springs
Nenana
Delta Junction
Dot Lake
Tok
Tanacross
Stebbins
Emmonak
Alakanuk
Kotlik
Sheldon Point
Scammon Bay
Mtn Village
Pilot Station
Marshall
Hooper Bay
St Mary's
Russian Mission
Grayling
Anvik
Shageluk
Holy Cross

Proposed summer chum and coho salmon Geographic Units




Proposed fall chum salmon Geographic Units
Wiseman
Venetie
Chalkyitsik
Bettles
Alatna
Beaver
Fort Yukon
Allakaket
Hughes
Circle
Stevens Village
Huslia
Ramparts
Tanana
Minto
Eagle
Fairbanks
Koyukuk
Nulato
Manley Hot Springs
Galena
Ruby
Kaltag
Nenana
Delta Junction
Dot Lake
Tok
Tanacross
Northway Junction
Stebbins
Emmonak
Alakanuk
Kotlik
Grayling
Sheldon Point
Anvik
Shageluk
Scammon Bay
Pilot Station
Mtn Village
Marshall
Holy Cross
Hooper Bay
St. Mary's
Russian Mission